WESTERN
PACIFIC
REGIONAL
FISHERY
MANAGEMENT
COUNCIL

Amendment 7

to the

Fishery Management Plan for the Pelagic Fisheries of the Western Pacific Region

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Proposed Limited Entry Program for the Hawaii Longline Fishery

(measures to replace the 1991-94 moratorium on new entrants to the fishery)

Includes Final Environment Impact Statement
and
Regulatory Flexibility Analysis

14 January 1994

Western Pacific Regional Fishery Management Council
1164 Bishop Street, Suite 1405
Honolulu, Hawaii 96813

COVER SHEET

Final Environmental Impact Statement (FEIS)

Responsible Agency
Western Pacific Fishery Management Council

Cooperating Agency
National Marine Fisheries Service (NMFS)

Title of Action
Amendment 7 to the Fishery Management Plan for Pelagic Fisheries of the Western Pacific Region

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Designation of the Statement
Final Environmental Impact Statement

Abstract
The action contemplated by the Council is to modify the pelagics fishery management program by establishing a new longline limited entry program for the longline fishery based in Hawaii. This new program will replace a current moratorium on new entry to the longline fishery. Persons eligible for permits initially are those who were longline limited entry permit holders at the end of the moratorium and (a) whose vessels were used to make at least one landing in Hawaii of longline-caught fish during the moratorium; or (b) whose vessels are smaller than 40 feet in length, or those people who qualified for or would have qualified for a longline limited entry permit due to eligibility for a limited entry permit for the lobster fishery in the Northwestern Hawaiian Islands. Permits would be transferable with or without a vessel. A vessel owner could upgrade a vessel up to the length of the longest vessel that was active under the moratorium. The amendment includes framework procedures for the adjustment of management regulations (including participation, catch, effort, etc.), in the event new information demonstrates the need for such action. The amendment will be complemented by provisions that will be implemented under framework procedures already in the FMP, to authorize the NMFS Southwest Regional Director to place observers aboard permitted longline vessels, and to implement a requirement for longliners to carry an electronic vessel monitoring system. The environmental analysis considers the impacts of the overall management program on fish stocks, fishery participants and related industries, and protected resources.

The purpose of the limited entry program is to regulate the growth of the longline fishery until additional information is available concerning the impacts of the longline fishery on the stocks, on other fisheries in Hawaii, and on protected resources. There is concern that unlimited increases in catch or effort could result in overfishing of swordfish, or adverse effects on the catch rates of troll and handline fisheries. There is also concern that increased landings by the longline fishery could result in adverse market impacts on troll/handline fishermen, as well as longliners. In addition, there is concern that unlimited growth of the longline fishery could have adverse impacts on marine turtles or other protected resources.

Whether the longline fishery is having adverse impacts on the pelagic stocks is unknown at this time, but it is known that there are takes of marine turtles and seabirds. As a result of a consultation under Section 7 of the Endangered Species Act, NMFS issued on 10 June 1993, a Biological Opinion (BO) and Incidental Take Statement (ITS) concerning the take of sea turtles in the longline fishery. The BO concluded that the longline fishery is adversely affecting sea turtles, but that it is not likely to jeopardize the continued existence of the species during the one-year period of the BO. The BO contains conservation recommendations for developing management policies and regulations through the Pelagics FMP which would help in reducing adverse impacts to listed species in the central North Pacific. The ITS authorizes taking of turtles in the longline fishery, but contains "reasonable and prudent measures" for NMFS actions, including the establishment of an observer program and VMS requirement. The conservation recommendations are not legally binding, but the reasonable and prudent measures are. The proposed amendment, by limiting upgrades of individual vessels in the fleet, in combination with provisions for a mandatory observer program and a VMS requirement, is consistent with the BO and ITS. The BO and ITS are discussed in the FEIS and copies are found in Appendix 3 to the FMP.

LIST OF AGENCIES AND ORGANIZATIONS RECEIVING DRAFT EIS

Federal Agencies (national offices)

Department of the Interior
Department of State
Department of Agriculture
Department of Transportation
Department of Commerce
National Oceanic and Atmospheric Administration
Department of Defense (Army)
Department of Health and Human Services
Small Business Administration
Environmental Protection Agency
Marine Mammal Commission

Federal Agencies (local offices)

US Fish and Wildlife Service
US Coast Guard
Army Corps of Engineers

State and Local Agencies

Hawaii Department of Land and Natural Resources
Hawaii Department of Business, Economic Development and Tourism
University of Hawaii
Hawaii State Library System
Hawaii Harbors Division
Office of Hawaiian Affairs
Guam Division of Aquatic and Wildlife Resources
Guam Department of Commerce
American Samoa Department of Marine and Wildlife Resources
Northern Mariana Islands Department of Natural Resources

Private Organizations

Hawaii Fishing News
Hawaii International Billfish Association
Big Island Fishermen's Association
Hawaii Fishermen's Foundation
Fishing Clubs in Hawaii
United Fishing Agency
Earthtrust
Center for Marine Conservation
Sierra Club

Combined FEIS/FMP Cross-reference Guide

This amendment has been prepared to serve as a combined FMP amendment and final environmental impact statement (FEIS). As such, the format is somewhat different from the format of a stand-alone FEIS. This approach is taken to reduce the volume of paper required, and to reduce the potential for misunderstanding by ensuring that all reviewers have the same document. Below is a listing of the sections in which information required for a FEIS is presented.

Cover Sheet - see FEIS COVER SHEET

Summary of DEIS - see SUMMARY (Section I.A) and DEIS COVER SHEET

Statement of Purpose and Need - See POTENTIAL PROBLEMS ADDRESSED BY AMENDMENT 7 (Section IV.)

Examination/Evaluation of Alternatives - see DESCRIPTION OF ALTERNATIVES (Section V.) and IMPACT ASSESSMENT (Section VI.)

Affected Environment - see CONDITION OF PELAGIC MANAGEMENT UNIT SPECIES AND FISHERIES (Section III)

Environmental Consequences (including short-term and long-term resource use tradeoffs and irreversible or irretrievable commitments of resources) - see IMPACT ASSESSMENT (Section VI.).

Mitigation Measures - see Framework Mechanisms and Procedures (Section V.B)

List of Preparers - see HISTORY OF PELAGIC FMP AND AMENDMENT 7 (Section II.C)

EIS Copies - see FEIS COVER SHEET

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

I. INTRODUCTION

I.A Summary of Amendment 7

I.A.1 Need for and scope of amendment

On 22 April 1994, the three-year Hawaii longline moratorium established by Amendment 4 to the Pelagic Fishery Management Plan of the Western Pacific Region (FMP) will end. The Western Pacific Regional Fishery Management Council (Council) must take action to prevent the Hawaii longline fishery from returning to open access.

The Council established the moratorium to limit unprecedented growth of the longline fleet because of concerns regarding the impacts of increased longline fishing on the resources and other fisheries. The moratorium was to provide a period of stability during which data would be collected and analyzed to determine the need and basis for a longer-term management regime for the longline fishery.

Much of the desired research and analysis has not been completed due to delays in funding. However, many of the concerns which initially prompted regulation of the longline fishery still exist. Returning to an open access situation would increase the risks of over-utilization, particularly of Pacific swordfish, and catch competition (localized decline in fish abundance and catch-per-unit-effort due to increased longline fishing effort). Unregulated growth of the longline fleet could also result in market competition that would be unfavorable to traditional fisheries (including the traditional tuna longline fleet), a greater likelihood of over-capitalization, and larger takes of protected species such as sea birds and turtles. The take of turtles is of special concern and is discussed in section IV.G. of this amendment. The National Marine Fisheries Service (NMFS) has issued a Biological Opinion and Incidental Take Statement concerning the take of turtles in the longline fishery, and the conservation recommendations and reasonable and prudent measures identified by NMFS were important in the Council's decisions on this amendment and for related actions dealing with a mandatory observer program and a vessel monitoring system requirement.

At the same time, modifications to current regulations governing the use of Hawaii longline limited entry permits are needed. The ability to transfer a permit or upgrade a vessel was severely limited under the moratorium rules. In addition, area closures were implemented after the moratorium took effect. The area closures required longline fishermen to usually operate a minimum of 50-75 miles from shore. Taken together, these regulations have resulted in an unstable business environment and increased safety concerns.

While there are other management concerns in the pelagic fisheries, Amendment 7 specifically addresses the concerns regarding the impacts of longline fishing on fish resources, other pelagic fisheries in Hawaii, and protected species. Swordfish is the only stock that the US longline fishery has the potential, if unregulated, to negatively

impact on a stock-wide basis. Hawaii-based longliners now take about 15% of the Pacific-wide swordfish harvest and about 42% of the total eastern central Pacific catch. To date, the majority of domestic swordfish landings have occurred in Hawaii. Managing the growth of the longline fleet that is permitted to land their catch in Hawaii is considered a prudent measure to address stock conservation concerns at this time, even though much larger distant-water fishing fleets from other nations participate in the same fishery. International agreements for pelagic longline fishery may be necessary in the future, as will the management of other US longline fishermen fishing on the high seas and landing fish in non-Hawaii US ports.

The proposed longline limited entry program and the continuing longline area closures both address the concerns of catch competition among longliners and commercial and recreational troll/handline fisheries. There is also growing concern about catch competition within troll/handline commercial and recreational fisheries. The Council is in the process of developing a comprehensive data collection program for these non-longline pelagic fisheries to improve the reporting and analysis of catch and effort information. Future research will also be directed at understanding intra-fishery interactions. Management measures to address catch competition problems within the troll/handline fisheries may be needed, but are beyond the scope of this amendment.

I.A.2 Proposed Actions

Amendment 7 proposes to implement a limited entry program for the Hawaii longline fishery to replace the moratorium which expires on 22 April 1994. The proposed limited entry program would have the following provisions:

- Any limited entry permit holder whose vessel made at least one landing in Hawaii of longline-caught fish during the moratorium would be eligible for a permit under the new program. If an individual or corporation has more than one permit, new permits would be issued to replace each qualifying permit.

- People with moratorium limited entry permits for vessels less than 40 feet long, or with limited entry permits based on the lobster fishery criterion, would be exempt from the landing requirement and, as such, would automatically qualify for a new permit.

- Permit holders would be allowed to upgrade their vessels or replace their vessels up to the length of the longest vessel that was active during the moratorium.

- Permits would be transferable, with or without the sale of the vessel, subject to the restriction on vessel upgrading.

- The limited entry program would include a framework process which would provide for adjustments in fleet size (upward or downward), catch and/or effort

as more information on the fisheries and the status of the stocks becomes available. Adjustment mechanisms could include, but are not limited to, fractional licensing, consolidation of permits, different types of permits, or individual quotas (IQs).

- Longliners holding a Hawaii limited entry permit would be required to have only one federal permit to fish throughout the Western Pacific region.

- The Regional Director would be allowed to charge fees to cover the costs of administering limited entry permits.

- Domestic longliners without Hawaii limited entry permits would be allowed to transit the EEZ or enter Hawaii ports to reprovision, but would be prohibited from offloading their catch.

In addition to the limited entry program, Amendment 7 proposes the following changes to the Pelagics FMP for the Western Pacific Region:

- Modifications to the definition of optimum yield (OY) to clarify that OY encompasses fishing by all vessels to the extent regulated by the FMP, as amended.

- Changes to the pelagic management unit to include currently-excluded species which are caught by the pelagic longline fishery (moonfish, pomfret and oilfish). Overfishing definitions for these species would also be added to the FMP through Amendment 7.

In September 1993, the Council also took complementary actions to request that the RD establish a mandatory observer program for the longline fishery and to implement a vessel monitoring system through the framework provisions of Amendments 3 and 4, respectively.

I.A.3 Objectives and Rationale for the Proposed Program

The goal of the FMP is to maximize the net benefits of the fishery to the region and the nation. Allowing expansion of fisheries while maintaining the long-term productivity of the fish stocks, and not substantially reducing the benefits from other fisheries harvesting the same stocks, will help achieve these benefits. That is, established commercial fisheries should remain profitable, recreational fisheries should provide satisfying recreational experiences, and traditional fishing practices for non-market personal consumption and cultural benefits should be allowed to continue.

Objective 1: To regulate the Hawaii longline fishery by limiting potential increases in effort in order to minimize the risk of adverse impacts on the longline fishery, other fisheries, the stocks, and protected resources such as sea turtles.

The proposed limited entry program would cap potential effort in the longline fishery by limiting both the number of participants and the size of vessels in the fishery. This is intended to limit increases in longline effort and prevent adverse effects on the stocks, other fisheries, and protected resources.

The eligibility criteria for new permits would allow no more vessels to qualify for permits under the new program than qualified for permits during the moratorium (approximately 166). Most permit holders under the moratorium are expected to meet the eligibility criteria, but the number may be less than that during the moratorium if some inactive permits are not used to land fish before the end of the moratorium. Further, vessel owners under the new program would be allowed to upgrade their vessels or transfer their permits to vessels up to the size of the largest vessel active in the moratorium period (about 93 feet to date). This provision is expected to result in some shift from smaller vessels to larger vessels. Large vessels (on average) set fewer hooks per year than small vessels. Therefore, even if the number of permitted vessels remains the same, a change in vessel size composition could result in less effort (expressed in total hooks deployed) than could have occurred during the moratorium with a fully active fleet.

Objective 2: To provide a fair and equitable opportunity to participate in the longline fishery.

The choice of permit eligibility criteria was based on a recognition that (a) those who participated in the moratorium should be permitted to continue in the fishery, (b) owners of small vessels displaced by the main Hawaiian Islands (MHI) area closures should be given an opportunity to participate in the fishery in the future, and (c) those who qualified for a longline permit by virtue of holding a NWHI lobster fishery permit should be given the continued opportunity to participate in the longline fishery since their primary fishery (lobster) has been and will continue to be curtailed by harvest quotas and six-month closed seasons. In the Council's view, these eligibility criteria represent a fair and equitable opportunity to participate in the longline fishery.

Objective 3: To relieve unwarranted economic strains experienced by longline vessel owners as a result of moratorium regulations, and leave individual business decisions concerning the use of their vessels and other resources to these vessel owners.

The Council is also aware that many vessel owners would like to be able to exit the fishery or upgrade their vessels. These people have been severely hindered by the stringent rules limiting permit transfers and vessel upgrades, as well as the area closures. This is especially true of the owners of small vessels whose operations have been disadvantaged by the main Hawaiian islands area closures that were established after the moratorium went into effect. Some vessel owners have also been affected by the unwillingness of financial institutions to provide loans as long as the permit transfer restrictions are in place. The proposed amendment would allow an unlimited number of permit transfers, as well as adjustments in individual vessel size

(i.e., up to the longest vessel active during the moratorium). These provisions will give permit holders the ability to obtain vessels large enough to fish beyond the nearshore closed areas and safely reach international waters where swordfish and bluefin tuna are most frequently caught. At the same time, limiting the number of longline vessels and restricting upgrades is expected to prevent any adverse impacts on fish stocks, other fisheries, and protected species.

Objective 4: To improve the ability of the Council and NMFS to respond rapidly to biological, economic, or social concerns which may arise in the pelagic fisheries of the western Pacific region.

The amendment includes broad framework procedures for changes in most elements of the management program, including all the elements of the proposed longline limited entry program, as well as area closures and exemption criteria now covered under framework procedures established by earlier amendments. The framework procedures would allow, for example, for changes in permit conditions, limits on catch or effort, and modifications of the reporting and observer requirements for longline vessels. This is intended to facilitate adjustments if new information demonstrates the need for regulatory changes. The framework procedures would allow adjustments to be made through a single action in the Federal Register, following one or two Council meetings at which the opportunity for public input was provided. This should allow for more rapid adjustment when necessary, as an amendment to the FMP would not be required for most actions.

Objective 5: To lessen administrative burdens of the longline permit program.

The proposed amendment also reduces administrative burdens by eliminating the present requirement for limited entry permit holders to have a separate general longline fishery permit to fish in non-Hawaii areas managed under the pelagics FMP.

Objective 6: To recover administrative costs of the limited entry permit program.

The amendment further provides that the NMFS may charge fees, subject to the limitations of the Magnuson Act, for permit actions under the limited entry program. The RD will determine the administrative costs associated with issuing permits and the appropriate fee to cover these costs. This fee (expected to be about $40-50 per permit action) ensures that fishery participants pay the cost of administering the permit program.

Objective 7: To provide equitable port privileges for domestic vessels and foreign longline vessels.

The proposed amendment would allow US longline vessels without Hawaii limited entry permits to make port calls in Hawaii to reprovision, provided their longline gear is stowed or sealed so it is not usable. This port call privilege, now granted to foreign longliners, has not been available to US vessels under the moratorium. The Council views this as unfair and would remedy this situation. The proposed change would also benefit shoreside support services and the general economy of Hawaii.

In summary, the proposed action is expected to provide permit holders more freedom than under the current moratorium to transfer their permits or change their vessel size (subject to the limitation on vessel upgrading), while maintaining a limited entry program for the longline fishery, and controlling the risk of adverse impacts on other pelagic fisheries or protected species. The amendment will also provide a process for timely changes in management as the need arises. Other provisions reduce administrative burden, provide for recovery of administrative costs, and grant equal port privileges to non-permitted domestic and foreign fishermen.

I.B Responsible Agencies

The Council was established by the Magnuson Fishery Conservation and Management Act (Magnuson Act) to develop FMPs for fisheries operating in the US Exclusive Economic Zone (EEZ) around American Samoa, Guam, Hawaii (including the Northwestern Hawaiian Islands), the Commonwealth of the Northern Mariana Islands, and other US possessions in the Pacific[1]. Once an FMP is approved by the Secretary of Commerce (Secretary), it is implemented by federal regulations which are enforced by the NMFS and the US Coast Guard, in cooperation with state and territorial agencies.

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[1] Howland and Baker Islands, Jarvis island, Johnston Atoll, Kingman Reef and Palmyra Atoll, and Wake Island.

II. HISTORY OF PELAGIC FMP AND AMENDMENT 7

II.A Existing Management Measures

II.A.1 Fishery Management Plan

The Fishery Management Plan for the Pelagic Fisheries of the Western Pacific (FMP) Region was developed by the Council, and its regulations were published by the National Marine Fisheries Service at 52 FR 5983[1] on 17 February 1987. The FMP included initial estimates of maximum sustainable yield (MSY) for the stocks and set optimum yield (OY) for these fisheries in the EEZ. The regulations applied to domestic and foreign fishing for billfishes, wahoo, mahimahi and oceanic sharks. Among the original regulations were a prohibition on drift gillnet fishing within the region's EEZ, and provisions for experimental fishing permits. The regulations for domestic fishing are found in 50 CFR 685[2]. Those for foreign fishing are found in 50 CFR 611, and those foreign fishing regulations affecting only the Western Pacific Region are contained in §611.81 subpart F. The FMP prohibited foreign longline vessels from fishing within certain areas of the EEZ, and additional areas up to 150 nm from Guam and the main Hawaiian Islands and up to 100 nm from the Northwestern Hawaiian Islands may be closed to foreign longline vessels if their fishing activity is causing adverse impacts on domestic fishery performance, excessive waste of catch, excessive enforcement costs, or adverse effects on stocks. No legal foreign longline fishing has occurred under the FMP.

As defined in the original FMP, optimum yield (OY) was the amount of each species in the management unit that will be caught by domestic and foreign vessels fishing in the EEZ in accordance with the measures in the FMP. At that time, the principal concern was regulation of the foreign longline fishery in the EEZ to ensure that foreign catches of billfish, mahimahi, wahoo, and sharks would not adversely affect domestic commercial and recreational fisheries for these species.

The FMP specified domestic annual harvest (DAH) and total allowable level of foreign fishing (TALFF) in non-numeric terms, i.e., the amount of fish that could be caught when fishing in accordance with the management measures in the FMP. The FMP also addresses joint venture processing (JVP) for billfish and other non-tuna species by stating that practically all fish caught by vessels in the EEZ are landed in a whole or dressed state without processing, and processors handle whatever processing that is performed; thus, there is no allowance for JVP.

The FMP also contained estimates of the amount of non-tuna species that would likely be taken under the FMP. Those estimates were intended to provide a benchmark for

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[1] 52 FR 5983 is read "Federal Register, volume 52, page 5987".

[2] 50 CFR 685 is read "Code of Federal Regulations, Title 50, Part 685".

evaluating changes in the fisheries, as well as the need for management revision. The region's pelagic fisheries have changed considerably since the FMP took effect (evidenced by the extent of management measures and amendments to the FMP), and further changes are expected in the future. Domestic fisheries have grown substantially (especially the Hawaii-based longline fishery), and the only authorized foreign fishing had been pole-and-line fishing for skipjack tuna which ended in 1992.

II.A.2 Amendment 1

The FMP was first amended at 56 FR 24644 on 29 June 1991. Amendment 1 included: a measurable definition of recruitment overfishing for billfishes, mahimahi, wahoo and oceanic sharks, b) a revised definition of OY, and c) a revised set of objectives to bring the FMP objectives into accord with the definitions of overfishing and the revised definition of OY.

Amendment 1 to the FMP was developed in response to the new Secretary of Commerce Guidelines for the Magnuson Act National Standards (Guidelines)(50 CFR Part 602). The Guidelines require an objective and measurable definition of overfishing for each species or species complex in a fishery management plan. The Guidelines indicate that the principal concern is "recruitment overfishing", which is a level or rate of fishing mortality that jeopardizes the long-term capacity of a stock or stock complex to produce maximum sustainable yield (MSY) on a continuing basis (§602.11(c)(1)). It is noted that different fishing patterns can produce a variety of effects on local and area-wide abundance, availability, size and age composition of a stock, and that some of these patterns have been called "growth," "localized," or "pulse" overfishing. These patterns are not necessarily overfishing under National Standard 1 of the Magnuson Act.

As modified in Amendment 1, OY is the amount of each species or species complex that can be harvested by domestic and foreign fishing vessels in the EEZ, without causing "local overfishing" or "economic overfishing" within the EEZ of each island area, and without causing or significantly contributing to "growth overfishing" or "recruitment overfishing" on a stock-wide basis. Amendment 1 also modified the objectives of the FMP to be consistent with a) the new Guidelines and b) the changing nature of the fisheries, including the growth of the longline fishery and the virtual absence of foreign fishing in the EEZ.

As defined by the Council, overfishing has occurred when the spawning potential ratio (SPR) for a stock has declined below specified threshold levels relative to the SPR of the unfished population (see section 6.1.1. of Amendment 1). This definition focuses on "recruitment" overfishing of the stocks on a stock-wide basis. According to the definitions of recruitment overfishing, billfish, mahimahi and wahoo would be considered overfished if their spawning potential ratio (SPR) is equal to or less than 0.20, and oceanic sharks are considered overfished when their SPR is equal to or less than 0.35. The SPR is a measure of the current reproductive capacity of these stocks

or stock complexes relative to their unexploited capacity, measured over their entire stock range.

As the definition of OY and the objectives of the FMP make clear, however, the Council also is concerned with "localized overfishing" and "economic overfishing" with a focus on conditions in the EEZ. These are conditions in which recreational fisheries are not satisfying to their participants or commercial fisheries are uneconomical due to availability of the stocks in the areas being fished relative to the fishing power of the fleets. These conditions may occur even though the stocks (on an oceanwide basis) are above the levels at which they would be considered "recruitment overfished." The Council intends to manage the fisheries so that the economic viability of commercial fisheries and the social benefits associated with satisfying recreational fisheries and with traditional fishing practices for non-market personal consumption are maintained. The FMP promotes, within the limits of managing at OY (emphasis added), domestic harvest of the management unit species in the EEZ and domestic fishery values for these species by enhancing the opportunities for satisfying recreational opportunities and profitable commercial fishing operations. Expansion of existing fisheries or the development of new fisheries would be managed in this context.

II.A.3 Amendment 2

Amendment 2, implemented by rules published at 56 FR 24731 on 31 May 1991, made permanent several regulations for domestic longline vessels first established by emergency interim rules (55 FR 49285 on 27 November 1990, and 56 FR 5159 on 8 February 1991). These regulations require longline vessels to have federal permits and maintain federal fishing logbooks. The regulations also authorized the placement of observers on longline vessels intending to fish within 50-nm "study areas" around certain areas in the Northwestern Hawaiian Islands (NWHI), to document the level of interaction with protected species. The existing observer requirement was nullified by Amendment 3 (see below).

II.A.4 Amendment 3

Amendment 3, implemented by rules published at 56 FR 52214 on 18 October 1991, made permanent previous emergency actions (56 FR 15842 on 18 April 1991, and 56 FR 33211 on 19 July 1991) to establish a protected species zone in the NWHI, in which pelagic longline fishing is prohibited. The zone was created to protect endangered Hawaiian monk seals. The zone extends 50 nm seaward from each of the islands in the NWHI, and includes certain 100-nm wide monk seal migratory corridors between islands where the 50-nm circles are not contiguous. This action effectively abrogated the regulations for the placement of observers in the 50-nm study areas created by Amendment 2. However, Amendment 3 includes framework provisions which would allow the NMFS Regional Director, in consultation with the Council, to modify conservation and management measures in response to changes in

the fishery or new information on protected species. In September, the Council requested the Regional Director implement through this framework procedure a mandatory observer program for the longline fishery throughout its range to collect more information on longline-turtle interactions.

II.A.5 Amendment 4

Amendment 4, implemented by rules published at 56 FR 51849 on 16 October 1991, extended previous emergency interim rules (56 FR 14866 on 12 April 1991, and 56 FR 28116 on 19 June 1991) that were implemented to arrest the rapid growth of the Hawaii-based longline fishery. The amendment established a moratorium on new participants from entering the Hawaii fishery for a total of three years, including the six months of the emergency actions, with limited exceptions for persons who had made certain financial commitments, and for participants in the lobster fishery. A longline vessel fishing in the Hawaii EEZ or using the EEZ with pelagic species on board, or landing pelagic fish in Hawaii, must have a limited entry permit. A one-time transfer of this limited entry permit has been allowed during the three year moratorium. The Council halted the expansion of the fishery to provide a period of stability during which data could be collected and analyzed to assess the impacts of increased longline effort. The moratorium expires on 22 April 1994.

II.A.6 Amendment 5

Amendment 5, implemented by rules published at 57 FR 7661 on 4 March 1992, closed certain areas around the main Hawaiian Islands and Guam to pelagic longline fishing. For Hawaii, the closure includes the area within 75 nm of the islands of Kauai, Niihau, Kaula and Oahu and within 50 nm of the islands of Maui, Molokai, Lanai, Kahoolawe and Hawaii. These areas in the main Hawaiian Islands were originally closed by emergency action (56 FR 28116 on 19 June 1991, corrected at 56 FR 31689 on 11 July 1991, and extended by 56 FR 47701 on 20 September 1991). For Guam, longlining is prohibited within 50 nm of Guam's 100-fm isobath, including offshore banks. This action was intended to prevent gear conflicts and vessel safety issues arising from interactions between longliners and smaller fishing boats. Amendment 5 also provided a framework mechanism to modify the area closures if new information indicates that a change is necessary in order to meet the objectives of the FMP. A seasonal reduction in the size of the closure was implemented by rules published at 57 FR 45989 on 6 October 1992. For the months of October through January, longline fishing is prohibited within 25 nm of the windward shores of all islands, except the windward coast of Oahu, where longline fishing is prohibited within 50 nm from shore. These given distances are approximations of the sizes of the closure areas, which are defined by straight lines. On the leeward shores of the islands, the closure remains consistent with the distances originally established by Amendment 5. For the months of February through September, the closed area is unchanged from that originally implemented by Amendment 5.

II.A.7 Amendment 6

In 1990, the Magnuson Fishery Conservation and Management Act was amended to include all tuna species as fish under United States management authority, effective 1 January 1992. Amendment 6 included these species as management unit species under the pelagics FMP. Implemented under rules published at 57 FR 48564 on 27 October 1992, Amendment 6 included tuna and related species of the genera *Allothunnus* spp., *Auxis* spp., *Euthynnus* spp., *Gymnosarda* spp., *Katsuwonus* spp., *Scomber* spp., and *Thunnus* spp. These genera contain all tuna species caught in the EEZ or by vessels based in the region. Amendment 6 also incorporated a definition of overfishing for tuna and related species that is consistent with that developed for the other management unit species in Amendment 1. The regulations established by Amendment 6 extended all domestic longline restrictions (area closures, no new fishing in the Hawaii EEZ, etc.) to prospective foreign longline vessels. Areas closed to longline fishing were also closed to foreign purse seine and baitboats. Finally, Amendment 6 extended general foreign fishing permit and observer requirements to all foreign pelagic fishing vessels, regardless of their gear type and target species.

II.B Public Review of Amendment 7

The Council seeks the advice of commercial, recreational and subsistence fishing interests, environmental groups, and other interested parties when making management decisions. This ensures that those who might be affected by new management measures have an opportunity to submit ideas and suggestions, and to be involved in the decision-making process.

The moratorium was a short-term management initiative. During the three-year period more information was to be gathered to determine the need for a longer-term effort limitation program, and based on the need assessment, a longer term management regime would be developed. To prepare for Amendment 7, the Council conducted an extensive scoping process, consistent with the requirements of the Magnuson Act, NEPA, and other applicable law. In July 1992, the Council reviewed a scoping paper prepared by the Council staff. This paper was modified and sent to over 4,000 Hawaii commercial fishing license holders and other interested people for review and comments in August. The need for action and the range of alternatives reviewed by the Council in April 1993 was based on written comments received, as well as public comments at Council meetings and advice from Council advisory bodies. At the April Council meeting, the Council reviewed comments received on the draft amendment and selected a preferred alternative. This amendment package was then revised to reflect the discussion and decisions from the April 1993 Council meeting.

A summary of draft Amendment 7 was mailed to over 1,600 commercial license holders and other interested parties prior to public hearings held on the islands of Hawaii and on Oahu on 22 July and 27 July 1993, respectively. The full amendment

package, including the draft EIS, was distributed to 252 fishing organizations, Council advisory groups, environmental organizations, public agencies, and other interested parties. Copies were also placed in libraries on all islands and were available from the Council office upon request. Comments from the public hearings, and meetings of the Council advisory bodies as well as written comments received were reviewed by the Council prior to making their final decisions on Amendment 7.

II.C. List of Preparers

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III. CONDITION OF PACIFIC PELAGIC MANAGEMENT UNIT SPECIES AND FISHERIES

III.A Species in the management unit.

The Pacific pelagic management unit species (PPMUS) include tuna, billfish, sharks, mahimahi, wahoo and other related species. The common and scientific names of the PPMUS of the FMP are shown in Table III-1.

Table III-1. Pacific Pelagic Management Unit Species[1]

Common Name	Scientific Name
Mahimahi (dolphin fish)	*Coryphaena* spp.
Marlin and Spearfish	*Makaira* spp. *Terapturus* spp.
Oceanic Sharks	family Alopiidae family Carcharinidae family Lamnidae family Sphyrindae
Sailfish	*Istiophorus* spp.
Swordfish	*Xiphias* sp.
Tuna and Related Species	*Allothunnus* sp. *Auxis* spp. *Euthynnus* spp. *Gymnosarda* sp. *Katsuwonus* sp. *Scomber* spp. *Thunnus* spp.
Wahoo (ono)	*Acanthocybium* sp.

[1] Amendment 7 proposes to add several other important species which are harvested by pelagic fisheries but which are currently not included as management unit species. These are moonfish or opah (Lampris sp.), pomfret (pelagic spp. of family Bramidae) and oilfish or walu (family Gempylidae)

III. B. Status of Stocks

Hawaii pelagic fisheries are under the management jurisdiction of the Western Pacific Regional Fishery Management Council (Council). However, many or all of the pelagic species exploited by Hawaii's fisheries belong to wide-ranging stocks fished by much larger fisheries throughout the Pacific. These fisheries include the longline, purse-seine, pole-and-line, and troll fisheries of Japan, the USA, Korea, Taiwan and other nations. Until recently (1993) they also included the drift gillnet fisheries of Japan, Korea, and Taiwan. The available information on status of the stocks of the six species most important to the Hawaii longline fishery (swordfish, blue and striped marlin, yellowfin and bigeye tuna, and albacore) is summarized below. Available information on other species harvested by Hawaii's pelagic fisheries is reviewed briefly. Little is known regarding the stock status of many other species (e.g., sharks).

The most common method to assess stocks of Pacific tuna and billfish is "production modeling", whereby the total fishery yield (catch) of the stock is modeled as a function of total fishing effort (Skillman 1989a). Production models are used to estimate maximum sustainable yield (MSY) as the highest average level of catch that can be sustained at the most productive (on average) level of fishing effort. When fishing effort increases above this level, yield subsequently declines. Unless data exists for high levels of effort with reduced yield, MSY cannot be estimated accurately. When fishing effort is below, at or above MSY level, the stock is said to be under-, fully-, or over-utilized, respectively (NOAA 1991b, NOAA uses "long-term potential yield [LTPY]" to refer to MSY). Over-utilization is synonymous with "growth overfishing" (Amendments 1 and 6). A stock that is over-utilized in this context is not overfished as defined by the Pelagic FMP (i.e., recruitment overfished). For most of the stocks discussed below, yields appear to level out at the highest levels of fishing effort rather than decline. In such cases, the best-fit MSY estimate is close to the highest level of catch seen in the fishery to date (Table III-2). Higher levels of effort may result in increased catch, and subsequent production modeling may result in higher estimates of MSY. Although categorizing a stock as fully-utilized in these circumstances is common (NOAA 1991b), it is not particularly meaningful.

The status of a stock as categorized by production modelling (e.g., fully-utilized) may contradict other indicators, such as spawning potential ratio (SPR). Overfishing is defined as an SPR below 0.20 for billfishes and tunas (Amendments 1 and 6). The SPR is a measure of the current reproductive capacity of the stock or stock complex relative to its unexploited capacity. There are no good estimates of SPR for the six important species covered below, but rough estimates of SPR (Table III-2) were made using the ratio between current CPUE and CPUE observed in the earliest period of exploitation. Where several fisheries exploit different sizes of fish, CPUE for the fishery that exploits mostly mature fish (i.e., the longline fishery) is the better indicator of SPR. This method is fourth in the ranked list of preferred methods for estimating

Table III-2. Various indicators of the status of stocks of six major species exploited by the Hawaii longline fishery. Catch and MSY are in metric tons (t). Areas as defined for MSY estimates and shown in Fig. III-1. The SPR indicators were estimated for this amendment from information discussed in the text.

Species	Area (Stock?)	MSY (t)	Source[a]	SPR	Utilization	Catch[b] (t)	Source[c]
Swordfish	Pacific	25,000	1	1.00	Unknown	29,000	8
Blue Marlin	Pacific	24,000	2	0.25	Over	22,000	8
Striped Marlin	North Pacific	Unknown	3	1.00	Under	10,000	9
Yellowfin tuna	Eastern Pacific	300,000	4	1.00[d]	Full	290,000	4
	Western & Central Pacific	Unknown	5	0.50	Under	375,000	5
Bigeye tuna	Pacific	160,000	6	0.35	Full	152,000	8
Albacore	North Pacific	Unknown	7	0.25	Over	59,000	1

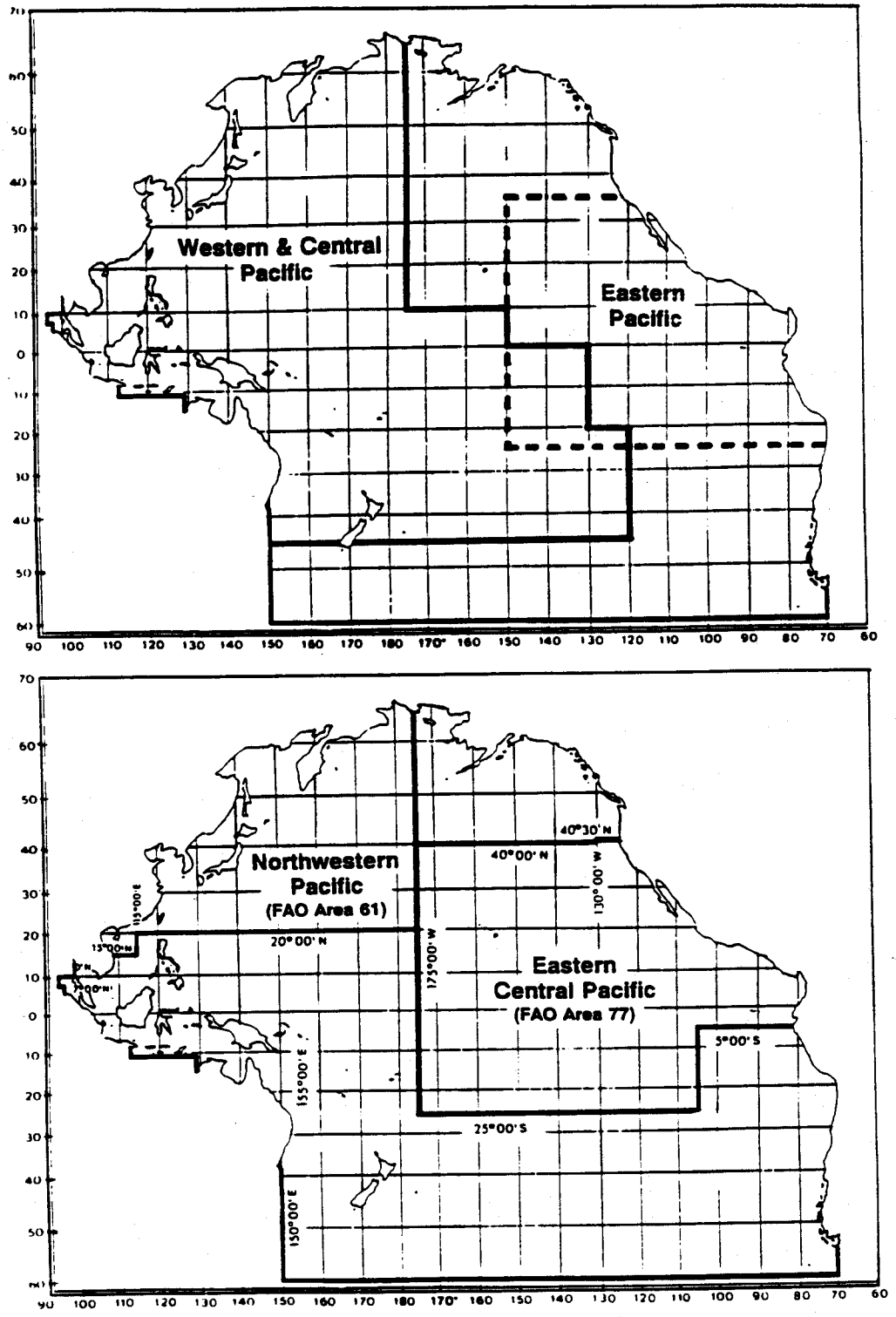
[a] Sources of MSY estimates = 1-NOAA(1991b), 2-Skillman(1989a), 3-Suzuki(1989), 4-Wild (1993), 5-Suzuki (1993b), 6-Miyabe (1991), 7- Bartoo and Foreman (1993)

[b] Catch for 1990 except for source 4 (1986 - 1989 average)

[c] Sources of catch data are the same as for MSY (footnote 1) plus: 8 - FAO (unpublished data), 9 - approximation based on the FAO statistics for FAO areas 61 (Northwest Pacific) and 71 (Eastern Central Pacific)

[d] Inconsistent with utilization status

Figure III-1. Areas used in reference to the status of stocks (Tables III-2 and III-3) as described by Suzuki (1993b), Wild (1993), and FAO (1990). The North Pacific area (not shown) is the area north of the equator. These areas may not be related to the true boundaries of any stocks.



SPR (see alternative d in Amendment 1). Longline CPUE from the earliest period of exploitation may be biased by several factors and may provide a poor index of unexploited reproductive capacity. Such biases could include initial fishing in small areas where density was atypical, and improvements in fishing methods and efficiency over time.

The fisheries and the data needed to assess the stocks belong to many nations. Presently, there is no single organizations or network of organizations with the responsibility to monitor the Pacific-wide tuna fisheries; thus, the data needed for stock assessment are far from adequate.

III.B.1 Swordfish

Swordfish occur mainly from California to Chile in the eastern Pacific, throughout the central Pacific and from Japan to Australia and New Zealand in the far western Pacific. The stock structure of swordfish in the Pacific is uncertain. Several studies indicate there is more than one stock. One hypothesis envisions three separate stocks: one in the northwestern Pacific, one in the southwestern Pacific, and one in the eastern Pacific, as evidenced by areas of apparent high abundance (Bartoo and Coan 1989). Data on the seasonal concentrations of sexually mature swordfish examined by Sosa-Nishizaki and Shimizu (1990) suggest the possible occurrence of four subpopulations of swordfish in different areas of the Pacific. These are the central North Pacific (waters around Hawaii), the Coral Sea, the area between 10^0 and 30^0 S and west of 110^0 W, and the equatorial Pacific.

Most of the total Pacific-wide swordfish catch is taken by the Japanese longline fishery directed at tunas, with the remainder taken by surface gear such as harpoons, drift gillnets, and handlines (Sakagawa 1989). Only the Japanese longline fishery catch-per-unit-effort (CPUE) data are suitable for estimating trends in abundance of Pacific swordfish stock(s), and these data present major problems in interpretation. The data reflect changes in fishing methods and species targeting that appear to account for major changes in CPUE which are unrelated to real abundance. These problems were considered, but not resolved by the most recent attempts to determine the status of swordfish stocks. Based on data through 1980, the tentative conclusion reached by the most recent assessments was that the stock(s) had not been exploited heavily enough to cause either an over-utilized condition (Skillman 1989a), or a noticeable decline in CPUE (Bartoo and Coan 1989). Although the data through 1980 are not recent, they contain useful information on the dynamics of the stock(s) through a period in which yields varied over a wide range, including yields higher than current yields.

No decline in CPUE would imply a high SPR (i.e., 1.0, Table III-2) but the CPUE data are questionable since there are indications that changes in fishing method and species targeting have influenced catchability. Evidence that the swordfish resource is

at least maintaining a high SPR is indicated by the fact that only a slight decline in fish size was found by Skillman (1989a).

Estimates of MSY (assuming a single stock) have increased as catch and effort have increased. Thus, despite the catch being near the most recent estimate of MSY, the stock may be under-utilized NOAA (1991b) which would be consistent with a high SPR (Table III-2). Skillman (1989a) estimated MSY at about 18,000 t (metric tons) using data through 1980. NOAA (1991a) reported MSY at 19,000 t and NOAA (1991b) reported MSY at 25,000 t (Table III-2). The total Pacific swordfish catch (FAO 1990, FAO, Viadell Terme di Caracalla, 00100, Rome, Italy, unpublished data) increased from <17,000 t to about 29,000 t from 1980-90 (Table III-2) with the catch in the eastern central Pacific increasing from 4,300 to 8,900 t (Table III-3). Less change occurred in the northwestern Pacific where the 1990 catch of 9,200 t (FAO 1990, FAO, unpublished data) was about average for the decade (1980-90). From 1990-1992 the Hawaii longline fishery directed at swordfish increased its catch from 1,500 t to almost 5,000 t, making it quite large in relation to eastern central Pacific or northwestern Pacific fisheries (Table III-3). This new fishery will be important to the future status of the stock(s), particularly if there is a central North Pacific subpopulation, as the data of Sosa-Nishizaki and Shimizu (1990) suggest.

Whether the recent increases in yield can be sustained at the present level of fishing effort is unknown, but the severe growth-overfishing of the Atlantic stock(s) (ICCAT 1992a, 1992b; NCMC 1993) suggests that close attention should be paid to the possibility of over-utilization of the swordfish stock exploited by the Hawaii longline fishery (see statement of problems). Although a recently completed production model analysis for North Atlantic swordfish suggest that the stock is recovering under a regime of reduced fishing effort (ICCAT 1992b), western North Atlantic swordfish may still be over-utilized (NCMC 1993). Age-structured assessments for Atlantic swordfish continue to show that the adult stock remains at about 50% of its 1978 level (ICCAT 1992b).

No indication of decreasing swordfish size has been found in the Hawaii fishery (Ito 1992), also suggesting no recent decline in the SPR of the stock. Swordfish gillnet fisheries off California and Mexico have declined in recent years (NOAA 1991a, Oscar Sosa-Nishizaki, Centro de Investigacion Cientifica y de Education Superior de Ensenada, pers. comm.) but the causes of the decline appear to be mostly economic and environmental. The recent agreement by the major driftnet fishing nations to abide by a United Nations General Assembly resolution to suspend large-scale, pelagic drift gillnetting in December 1992, may not have much impact on swordfish in the North Pacific, since the fishery appears to harvest only a few thousand metric tons in that region (Ueyanagi et al. 1989).

Table III-3. Catch (in metric tons) of tuna, billfish, and other pelagic species by areas of interest compared with Hawaiii catch (t). Areas as shown in Fig. III-1.

Species	Area Stock (?)	Catch[1] (t)	Hawaii[2] (t)	Hawaii (%)[3]
Swordfish	Pacific	29,000		15%
	Northwest Pacific (FAO)	9,200		
	Eastern Central Pacific (FAO)	8,900	5,000	42%
Blue Marlin	Pacific	22,000	630	3%
Striped Marlin	North Pacific	10,000	430	4%
Yellowfin tuna	Eastern Pacific	290,000		0.04%
	Central & Western Pacific	375,000	1,220	0.03%
Bigeye tuna	Pacific	152,000	1,770	1.2%
Albacore	North Pacific	59,000	420	0.7%
Mahimahi (Dolphin fish)	Pacific	27,900		N/A
	Eastern Central Pacific (FAO)	N/A[4]	540	N/A[4]
Wahoo (Ono)	Pacific	720		N/A
	Eastern Central Pacific (FAO)	N/A[4]	170	N/A[4]

[1] Mostly 1990 FAO statistics unless noted otherwise in Table 2.

[2] Hawaii data for 1992 (preliminary)

[3] Hawaii 1992 catch as a percentage of the total for each area or stock. Percentage based on the assumption that total catch stayed relatively stable over the last several years, except for swordfish. The large 1990-92 increase in the Hawaii swordfish catch (3,100t) was added to the area or stock totals before calculating Hawaii's percentage of the swordfish catch.

[4] N/A FAO Statistics do not routinely contain reports on wahoo or mahimahi catch.

III.B.2 Blue Marlin

Pacific Blue Marlin appear to consist of a single stock centered about the equator, with the northern and southern extent of its distribution varying seasonally within water temperatures above about 24°C. The single-stock hypothesis is based on the continuous distribution of larvae and adult fish, a few long-distance tag returns, and the similarity of CPUE trends across a broad area (Skillman 1989b). Most blue marlin are caught by foreign, distant-water longline fisheries targeting tuna; the species is also taken as a bycatch of the tuna purse-seine fishery (Sakagawa 1987). The relatively low price commanded by blue marlin as a food fish places this species low on the species priority list of the longline fisheries. The blue marlin's greatest value is to charter and recreational troll fisheries throughout the Pacific."

A production model for blue marlin based on data through 1980 showed that the fishing effort required to produce an MSY of about 19,000-24,000 t (Table III-2) was exceeded in the mid-1960s and that during the 1970s the blue marlin resource was over-utilized (Skillman 1989a). Effective longline effort for blue marlin declined in the mid-1980s as the longline fisheries changed fishing methods to target deep-swimming bigeye tuna. "Effective" effort refers to longline effort corrected to account for longline depth changes over time. Longline catch and effective effort data through 1985 showed that, even though fishing effort declined after 1981, yield did not change (Suzuki 1989). The lack of relationship between catch and effort suggested that effort had little effect on the stock (Suzuki 1989). Another interpretation is that since longline CPUE (corrected for targeting) during the late 1970s declined to about 19% of the level during the earliest years of exploitation (SPR=0.19), the blue marlin stock was overfished (by Amendment 1 definition). This may have interfered with recruitment for some time, slowing the recovery of the stock when fishing effort declined after 1981. By 1985, CPUE had recovered a little, suggesting a SPR of about 0.25 (Table III-2). Effective longline effort for blue marlin in more recent years is unknown, but increased purse seine activity and blue marlin bycatch in the tropical western Pacific may have added to the pressure on the stock.

The total annual Pacific catch of blue marlin has increased in recent years to about 22,000 t in 1990 (Table III-2) and the resource is still tentatively categorized as over-utilized (NOAA 1991a, 1991b). Even at MSY, this resource might not be at OY because of its much greater value to recreational fisheries, which benefit from higher CPUE and lower yield.

III.B.3 Striped Marlin

Striped marlin occupy more temperate waters than blue marlin, ranging to latitudes as high as 45° N and 45°S in the western Pacific. The abundance of adults is low near the equator in the western Pacific, with high concentrations of larvae north and south of the equator. Thus, the species may be comprised of separate North and South Pacific stocks with a possible spawning aggregation in the western Pacific. This North

and South Pacific stock structure is the working hypothesis for stock assessments (Skillman 1989a, 1989b; Suzuki 1989). High catch rate areas are found in the northern central Pacific (near Hawaii), in the southern central Pacific and in the eastern tropical Pacific on both sides of the equator (Skillman, 1989b). Striped marlin tagged off California and Mexico have been recovered in Hawaii.

Foreign, distant-water longline fisheries, directed mostly at tunas catch most of the striped marlin harvested in the North Pacific, with a peak of about 21,000 t in 1968 (Suzuki 1989a) and annual catches of about 7,000-14,000 t in the 1980s. Longliners sometimes target striped marlin in the eastern tropical Pacific. Striped marlin are also important to recreational and charterboat fisheries, especially in the eastern Pacific. In the north Pacific the foreign large-mesh drift gillnet fishery also harvested about 2,000-4,000 t per year of striped marlin during the 1980s (Ueyanagi et al. 1989).

The two most recent attempts to assess the North Pacific striped marlin stock using longline catch and effort data were unsuccessful in fitting reasonable production curves to the data (Suzuki 1989, Skillman 1989a). Neither assessment found a decline in yield under increased fishing effort. Based on some area adjustments to FAO statistics, the total North Pacific harvest in 1990 was about 10,000 t (Table III-2). Japanese longline data indicated wide fluctuations in CPUE without clear trends during the 1952-1985 period (Suzuki 1989) suggesting that these fisheries have had little or no impact on either the stock or SPR (i.e., SPR = 1.0, Table III-2).

III.B.4 Yellowfin Tuna

Yellowfin tuna are widely distributed in the Pacific, and are most abundant between 20°N and 20°S latitude, where the distribution of adults and larvae is continuous across the Pacific. Despite much study, definitive information on the stock structure, movements, and population dynamics of yellowfin tuna is scarce. Yellowfin tuna caught by Hawaii fisheries may belong to a central Pacific stock which is separate from eastern and western Pacific stocks (Suzuki et al. 1978), but no conclusive evidence supports this hypothesis (Suzuki 1993a). No stock assessments exist for this possibly distinct central Pacific stock. Morphometric studies and some genetic studies suggest even more localized stocks, but other genetic work is contradictory (Wild 1993). Evidence from tagging programs suggests that most yellowfin tuna remain within a few hundred miles of their tagging location, but about 10% of long-term (>180 days) tag recoveries are at distances of over 1,000 nm (Lewis 1992). One recent study suggests that large (>100 cm) yellowfin tuna are much more mobile than small ones (Bard and Scott, 1992).

Eastern Pacific purse-seine and longline fishing effort increased from the early 1960s to the early 1980s. Longline CPUE and purse-seine CPUE for large fish declined over this period to reach an average of about 1/3 of that experienced in the early years of exploitation (SPR = 0.33). Purse-seine harvests of small fish appeared to have reduced the subsequent abundance of older fish (Wild 1993). After a temporary

reduction in fishing pressure, and several El Niño events in the mid-1980s, the productive capacity of the stock as indicated by the MSY, increased above the previous MSY level by about 60% after 1985. Improved recruitment and fishing methods that target larger fish (i.e., targeting schools associated with porpoises, as opposed to free-swimming schools or schools associated with floating objects) may have contributed to the increase in productive capacity. Both longline and purse-seine CPUE increased to levels similar to those seen in the early period of exploitation. Thus SPR could be estimated at around 1.0 (Table III-2) although the change in productive capacity may invalidate this SPR index. The SPR calculation assumes that the unexploited spawning potential is a fixed point of reference, whereas the change in the stock productivity suggests a change in unexploited spawning potential, and in the carrying capacity of the environment. Currently, MSY for the eastern Pacific is estimated at about 300,000 t with recent annual catches (1986-89) averaging about 290,000 t (Table III-2) at an effort level slightly below that required for MSY (Wild, in press). The eastern Pacific stock appears to be fully utilized at the current levels of fishing effort and productive capacity.

Japanese longline CPUE statistics from the western Pacific (west of 180° W longitude) were used by Suzuki et al. (1989b) to estimate MSY at about 70,000-112,000 t for the longline fisheries of Japan, Korea, and Taiwan (combined). The highest level of effort was in 1980-81 with catch at 70,000-90,000 t. Longline catch and effective fishing effort for yellowfin tuna have since declined due to reduction of fleets and changes in fishing methods to target bigeye tuna for the Japanese sashimi market. Yellowfin tuna CPUE (corrected for targeting) remained low throughout the 1980s, with a record low level in 1989 (Suzuki 1993). Overall, western Pacific longline CPUE has declined to an average of about half the level seen in earlier years (SPR = 0.5, Table III-2).

Purse-seine fisheries (mostly by Japan and the USA) caught most of the yellowfin tuna harvested in the central and western Pacific since the early 1980s. Purse-seine caught yellowfin tuna include a much higher proportion of juveniles than the longline catch. Also, since the mid-1970s, growing numbers of small yellowfin were caught by developing multi-gear tuna fisheries in the Philippines and Indonesia. Increased mortality of small yellowfin tuna may have a negative impact on the longline fishery, with fewer juveniles surviving and growing to enter the longline fishery, which takes larger fish. The record low longline CPUE observed in 1989 could have resulted from the major (50%) increase in purse-seine catch that occurred in 1987 (Suzuki 1993b). This fishery interaction appears to have been localized, with longline yellowfin CPUE decreasing mostly in the area of heavy purse-seine fishing.

Purse-seine fishing methods are diverse, and problems with the availability and interpretation of purse-seine data have so far prevented estimation of MSY for the central and western Pacific. Suzuki et al. (1989) found that purse-seine catch continued to increase with effort and suggested that the 1984-86 catch level of 200,000-210,000 t (all gears) in the western central Pacific (FAO area 71) appeared to be sustainable at the concurrent level of effort. Subsequent (1987-90) catches in this

area ranged from 200,000-280,000 t (FAO 1990, FAO, unpublished data). The total catch in the western and central Pacific (Fig III-1) as described by Suzuki (in press b), has doubled since 1980 to reach a total of about 370,000-380,000 t in 1990. CPUE has been highly variable due to changes in targeting and environmental effects (Suzuki, in press a, b).

Fishing effort and yellowfin tuna catch are expected to increase to unprecedented levels in the central and western Pacific. A comprehensive stock assessment of western Pacific yellowfin is needed. The Western Pacific Yellowfin Research Group (WPYRG) was established in 1990 to facilitate collaborative research on western Pacific yellowfin tuna for management advice. The participants are scientist and fishery officers of south Pacific island nations, distant-water fishing nations, the South Pacific Commission (SPC) and the Forum Fisheries Agency (FFA). All of these participants have an interest in research and management of the tropical tunas of the western and central Pacific Ocean. At its first meeting (Port Vila, Vanuatu, June 1991), the WPYRG took note of the limited progress made in reducing the uncertainty about the status of the yellowfin stock and of the urgent need for developing scientific advice for fishery management. The WPYRG, therefore, agreed on the goal of assessing the condition of the yellowfin tuna stock(s) of the central-western Pacific region in order to provide scientific advice for informed fishery management decisions. Their second meeting was held in Honolulu, in June 1992, to create a comprehensive catch and size-frequency database. Preliminary results of the SPC yellowfin tuna tagging study presented at the meeting suggest that the purse-seine harvest of yellowfin in the central and western Pacific could increase without harm to the stock (Hampton 1992).

III.B.5 Bigeye Tuna

Bigeye tuna are distributed throughout the Pacific to higher latitudes than yellowfin tuna (45° N - 40° S in the western Pacific and 40° N - 30° S in the eastern Pacific). Catch rates in the Japanese longline fishery indicate several east-west zonal bands of high abundance. These bands are in temperate waters around 35° N and in the tropics around 10°N, with a similar pattern in the southeastern Pacific.

Reproduction occurs at lower latitudes, suggesting migratory behavior between feeding and spawning grounds. Of 12 long-term (0.7-4.2 yr) tag recoveries summarized by Miyabe (in press a), six were within 400 nm and three were beyond 1,000 nm from the point of release. Although the stock structure of bigeye tuna is not well understood, the continuous distribution of adults, widespread spawning across the tropics, and the concurrence of size-class modes across broad areas suggest that there is a single Pacific stock (Miyabe, in press a).

Bigeye tuna are the primary target of Japanese, Korean and Taiwanese longline fleets which harvest most of the total catch. Effective fishing effort for bigeye tuna continued to increase, even after the reduction in size of the foreign longline fleets in the early

1980s, due to increased numbers of hooks set per vessel and the greater fishing depth which improved the fishing effectiveness for bigeye tuna. Since 1975, the total annual catch of bigeye tuna in the Pacific has fluctuated between 105,000-152,000 t (152,000 t in 1990, Table III-2). These totals do not include significant quantities of small bigeye tuna caught by purse seine and diverse Philippine and Indonesian fisheries. In addition, Perhaps 10% of the small tunas identified by purse-seine fishermen as "yellowfin tuna" are actually bigeye tuna. Increased catches of small bigeye tuna appear to be detrimental to the subsequent abundance of the large fish caught by the longline fishery (Miyabe, in press b).

Average longline CPUE (corrected for gear depth changes) in the 1980s was 45% as high as the average CPUE in the early period of exploitation (Miyabe, in press a). CPUE reached a record low in 1988 (about 35% of the initial average CPUE, i.e., SPR = 0.35). CPUE continued to be poor in 1989-1992. The bigeye stock may be near full exploitation (Table III-2) since MSY is estimated at about 160,000 t (Miyabe 1991), and effort appears to be nearing the MSY level.

III.B.6 Albacore

Albacore are found in temperate and tropical waters throughout the Pacific. The widely-accepted hypothesis for the stock structure of albacore is that there are at least two stocks, North and South Pacific, with separate spawning areas in the tropics north and south of the equator. Troll, drift gillnets and baitboat fisheries (pole-and-line) exploit the younger surface-dwelling fish in temperate waters, whereas longline fisheries harvest older, larger fish inhabiting deeper and more tropical waters.

The annual estimated catch of albacore in the North Pacific (Table III-2) in 1988-90 was 59,000 t (NOAA 1991a), down from levels exceeding 100,000 t during the 1970s. MSY has been estimated at 90,000-200,000 t, but none of the estimates is reliable due to problems with troll and baitboat CPUE indices (Bartoo and Foreman, in press). Catches declined mostly in the Japanese baitboat fishery and the A mainland-based troll fishery. Baitboat and troll catches (combined) declined from 75,000-105,000 t in the mid-1970's to about 15,000 t in 1990 (NOAA 1991a); effort by both these fisheries also declined. The abundance of young, surface-caught fish declined by about one-third after 1977 (Bartoo and Foreman, in press). Environmental changes could have affected the productivity of the stock, as they have with yellowfin tuna (see above).

The expansion of the drift gillnet fishery in recent years has made this the dominant fishery for albacore in the North Pacific and raised concerns that the stock may be over-utilized or over-fished. In 1989, the drift gillnet catch was estimated at 20,000 t. More recent estimates that include estimates of the rate at which dead fish drop out of nets (killed but not harvested) suggest the catch may be 30,000 t or more (Holts et al. 1992). The US trolling fleet recently noted that over 7% of their albacore catch showed fresh net markings, suggesting encounters with drift gillnets (Bartoo et al., in

press). The suspension of large-scale, pelagic drift gillnetting in December 1992 has considerably reduced fears of long-term damage to the stock.

During the 1980s the annual longline catch of albacore has averaged around 15,000 t, about the same as in the preceding decade (NOAA 1991a). The Japanese fleets harvested approximately 95% of this catch. Although overall Japanese longline CPUE declines suggest a SPR of about 0.25 (Table III-2), Japanese longline CPUE for two index areas presented at the 12th Albacore Workshop (fide Bartoo and Foreman, in press) suggested that although "feeding area" CPUE has declined to about one-fourth of the level seen in the early years of exploitation, "spawning area" CPUE was stable. Hence, the workshop concluded that the abundance of the adult stock was stable (Bartoo and Foreman, in press). Other sources (NOAA 1991a, 1991b) list the stock as over-utilized (Table III-2).

III.B.7 Other species

Other pelagic species harvested by Hawaii's pelagic fisheries include skipjack tuna, kawakawa, frigate tuna, bluefin tuna, dolphin fish (mahimahi), wahoo (ono), shortbill spearfish, black marlin, sailfish, pomfrets (manchong), moonfish (opah), gempylids (walu), mako sharks, thresher sharks, and others. Species that are discarded include blue sharks, other sharks, pelagic stingrays, lancetfish, ocean sunfish (mola mola), snake mackerel, and others. Very little is known regarding the stock structure or status of most of these species. Skipjack tuna are considered to be under-utilized (Boggs and Kikkawa 1993, Hampton 1992). Skipjack and other small tuna species are not important to this amendment since the longline catch of these tuna is negligible compared with other Hawaii fisheries. Mahimahi and wahoo are of particular concern because the longline catch is sizable in comparison to the catch by other Hawaii fisheries that place a greater value on these species. Commercial troll fishermen target mahimahi and wahoo because these small-vessel fishermen make short, frequent trips and can land a fresher, higher-priced product than longline fishermen. The reported magnitude of the Pacific catch of mahimahi and wahoo (Table III-3) may be unreliable because the catch of these species is often not reported to the FAO. In particular, US catches in the eastern central Pacific are not reported. Thus, the data on these species are often inadequate to show the catch, let alone the status of stocks.

III.C. Description of Fishery Sectors

III.C.1. Harvesters

Hawaii's pelagic fisheries catch more tons of fish than all other fisheries in the state. The Hawaii catch is far greater than the catch by fisheries in the other areas under Council jurisdiction (i.e., Guam, American Samoa, and the Northern Marianas). However, Hawaii's pelagic fisheries are small by Pacific standards (Table III-3). Hawaii's pelagic fisheries supply the bulk of fresh fish consumed in Hawaii, and the

catch is exported to Japan, the mainland USA, and Europe. The fisheries are also important to Hawaii's cultural heritage, and include popular recreational fisheries.

III.C.1.a Gear types

The gear types, size of vessels, and target species in Hawaii's domestic pelagic fisheries are diverse (Boggs and Ito 1993). Commercial pole-and-line and longline fisheries utilize large (>12 m) vessels. Commercial, recreational, and subsistence troll and handline fisheries use smaller vessels. The pole-and-line fishery targets skipjack tuna and lands very little of any other species.[2] The longline fishery targets swordfish, bigeye tuna, and yellowfin tuna. The troll and pelagic handline fleets primarily target yellowfin tuna, mahimahi, and blue marlin. The charter and recreational troll fisheries may target blue marlin more than the commercial troll fishery but these sectors are difficult to distinguish in the existing data since they often sell at least part of their catch.

The longline fishery

Longline gear catches fish using baited hooks on hundreds of branch lines attached to a single long main line set horizontally across 1-60 (usually 20-30) miles of ocean. The main line is buoyed at regular intervals by float lines connected to surface floats. Longliners fish at a variety of depths depending on the target species. Fishing depth is determined by the length of the floatlines and branchlines, and the amount of sag in the main line between floats. The depth of the hooks affect their efficiency at catching different species (Hanamoto 1976, 1987, Suzuki et al. 1977, Boggs 1992). Each longline "set" from gear deployment to retrieval, requires most of a day to accomplish. Each fishing trip by a Hawaii longline vessel entails many sets, and a trip often lasts several weeks. A typical longliner carries a crew of six, including the captain, although some of the smaller vessels operated with a four-man crew.

Traditionally, longline gear was set to fish primarily during daylight and targeted yellowfin and bigeye tuna using scad (opelu), squid, sardines, herring, or saury for bait. During the 1970s, longline fisheries in Hawaii and elsewhere began to set deeper gear to catch more valuable bigeye tuna.

The tuna longline fishery adopted new monofilament gear in the late 1980s, replacing older-style rope "basket" gear with a more flexible system of line throwers and snap-on branch lines and floatlines that allowed much greater flexibility in fishing depth (Kawamoto et al 1989, Boggs and Ito, in press). This flexibility contributed to the development of the swordfish longline fishery in the 1990s. Shallow-set longline gear

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[2] Although the troll, handline, and longline fisheries also catch skipjack tuna it is a minor component of those fisheries. Further description of the pole-and-line fishery for skipjack tuna (Boggs and Kikkawa 1993) would be irrelevant to this amendment.

is used at night, with luminescent "light sticks" that attract swordfish and bigeye tuna. Large "hard" squid (*Illex* sp.) are the preferred bait.

In the late 1980s, vessels began joining the Hawaii longline fishery after leaving US east coast tuna and swordfish fisheries. The expanded fishery became the largest fishery in the state in terms of landings and revenue. The new vessels were mostly steel-hulled, up to 33 m (107 ft) in length, and equipped with modern electronics (radar, Global Positioning System [GPS], radio beacons, radio-facsimile [FAX] and electronic thermometers) for use in navigation, gear location, and finding fish associated with temperature fronts.

Hawaii longliners range much farther from shore than the smaller vessels used in the troll and handline fisheries. In the fishery's early years, most of the catch was reported to come from areas 2-20 nm off Waianae, Oahu and off Kona, Hilo, and Hamakua, Hawaii (June 1950). Bigeye tuna catch rates were found to be higher off the windward coasts (i.e., Hilo and Hamakua) in winter than they were off sheltered leeward coasts (i.e., Waianae, Kona) where yellowfin tuna were abundant in summer (Shomura 1959). During the 1960s, a growing number of longliners extended their range 100-400 nm south of Oahu, where CPUE was found to be higher than average (Hida 1966). In the early 1980s Hawaii longliners told researchers that they had to travel progressively farther from the islands to locate good fishing grounds (Hawaii Opinion 1984). Ten vessels fished exclusively outside the Hawaiian EEZ in 1992 while 104 vessels fished both inside and outside the EEZ. Only 9 vessels fished exclusively within the main Hawaiian islands EEZ. Over half of the trips taken in 1992 made at least one set outside the EEZ surrounding Hawaii (Table III-4).

With the advent of the swordfish longline fishery in the 1990s, a segment of the fishery began to routinely make trips beyond the EEZ to swordfish grounds 400-1,000 miles away, predominantly to the north of the Hawaiian islands. In 1991, there were approximately 23 vessels, about 16% of the longline fleet, in this distant water fishery, which targeted swordfish year-round. In 1992, 66 vessels targeted swordfish sometime during the year, while 27 vessels fished for swordfish full-time. Trips targeting swordfish accounted for 23% of the total number of longline trips taken in 1992.

At present, most of the Hawaii-based longline vessels do not have the fuel or ice carrying capacity, or are not large enough to safely participate full-time in the swordfish fishery. Swordfish longliners average 30-40 days at sea per trip and fish up to 1500 miles from Hawaii, compared to tuna longliners that average 7-10 days per trip and fish closer to the islands (Dollar 1991). The majority of the swordfish catch is made well beyond the 200 mile EEZ. For other species, the proportion caught outside varies depending on the species (Table III-5). Tables III-6 and III-7 present quarterly catch information through June 1993 for inside and outside the EEZ, respectively.

Table III-4. Fishing effort outside the Hawaii EEZ and inside the EEZ of the eight main Hawaiian islands (MHI) by Hawaii longliners and inside the EEZ by other Hawaii pelagic fisheries. Virtually all of the catch by other gears was within the MHI EEZ.

	Longline		Other Gears
	Outside HI EEZ	Inside MHI EEZ	Inside MHI EEZ
Active Vessels	113[1]	114	1,585
Trips	771[2]	775	26,600[2]
Hooks (thousands)	6,803	4,864	Unknown

[1] Vessels and trips that made at least one set outside the US EEZ. Also, 63 vessels made 133 trips that made at least one set in the EEZ of the northwestern Hawaiian Islands (NWHI). The number of vessels and trips for all areas is not additive, since a trip may include several areas. Nine vessels operated exclusively inside the MHI EEZ while 10 vessels operated exclusively outside the Hawaii EEZ. The fleet as a whole made 544 trips exclusively outside the MHI EEZ. A total of 1,299 trips were taken (all areas) in 1992.

[2] Troll and handline trips (total) in 1991. Estimate of number of vessels based on HDAR license records. Commercial vessels only, number of recreational troll-handline vessels is unknown.

Table III-5. Proportions of the total 1992 catch caught outside and inside the EEZ of the eight main Hawaiian islands (MHI) by Hawaii longliners and inside the EEZ by other Hawaii pelagic fisheries. Virtually all of the catch by other gears was within the MHI EEZ. Proportions are given as percent by weight of the total catch of each species by all gears. Longline CPUE (number caught/1,000 hooks), by area is also presented

	Longline				Other Gears
	Outside MHI EEZ		Inside MHI EEZ		Inside MHI EEZ
Species Caught	Percent total	CPUE	Percent Total	CPUE	Percent Total
Swordfish	90%	9.9	10%	1.5	<1%
Yellowfin Tuna	13%	0.6	13%	0.8	74%
Bigeye Tuna	45%	3.1	50%	4.7	5%
Albacore	70%	2.3	17%	0.8	13%
Blue Marlin	22%	0.3	34%	0.6	44%
Striped Marlin	35%	0.9	58%	2.0	7%
Mahimahi (Dolphin Fish)	43%	6.4	13%	2.7	44%

Table III-6a. Longline Catch and Effort Information From NMFS Logbook Program (Inside the EEZ, 1991-1992, By Quarter)

	1991								1992							
	January - March		April - June[2,3]		July - September		October - December		January - March		April - June		July -September		October-December[4]	
	MHI	NWHI	MHI	NWHI	MHI	NWHI	MHI	NWHI	MHI	NWHI	MHI	NWHI	MHI	NWHI	MHI	NWHI
Effort Information																
# Vessels	112	61	108	50	87	33	82	22	73	39	89	31	60	17	70	20
# Sets	2,005	406	1,831	486	928	213	1,359	149	1,045	268	781	213	666	129	1,633	120
Number of Fish Caught																
Swordfish	2,986	3,293	8,226	4,521	1,546	1,361	764	265	1,107	1,865	3,450	1,604	581	1,147	1,907	495
Bigeye Tuna	10,693	2,033	2,712	983	1,911	568	6,807	870	5,445	1,210	2,061	304	1,549	203	13,823	832
Yellowfin Tuna	1,800	437	2,293	572	2,187	211	828	153	699	178	403	84	1,519	42	1,207	80
Blue Marlin[1]	2,686	195	2,007	378	368	68	985	80	905	93	670	78	322	47	850	25
Striped Marlin	4,851	989	3,569	1,083	542	159	2,320	213	2,814	787	1,305	356	693	197	4,996	338
Mahimahi	6,405	513	3,748	1,194	2,016	103	5,189	193	2,103	91	1,104	1,335	2,542	680	7,540	200
Shark	3,557	3,322	3,960	3,744	2,568	2,668	3,036	925	2,427	3,423	2,567	2,300	2,738	2,095	3,940	1,052
Albacore	736	254	2,231	124	1,424	55	1,255	48	323	201	575	43	1,207	14	1,862	50

[1] Blue Marlin catch may be overstated and striped marlin catch may be understated due to species identification problems.
[2] NWHI closures went into effect 4/15/91
[3] MHI closures went into effect 6/14/91
[4] MHI seasonal closure adjustment went into effect 10/1/92

Table III-6.b. Longline catch and effort information from NMFS logbook program (Inside the EEZ, Jan-June 1993)

	1993			
	January - March		April - June	
	MHI	NWHI	MHI	NWHI
Effort Information				
# Vessels	58	51	79	45
# Sets	1,057	465	1,089	377
Number of Fish Caught				
Swordfish	798	2,754	2,572	4,110
Bigeye Tuna	8,436	3,759	3,970	1,392
Yellowfin Tuna	2,677	1,106	1,447	296
Blue Marlin	457	97	743	193
Striped Marlin	2,460	681	2,335	1,141
Mahimahi	3,819	537	1,312	1,029
Shark	2,420	4,847	2,696	6,919
Albacore	593	691	2,699	203

Table III-7. Longline catch and effort information from NMFS logbook program (Outside the EEZ, 1991-June 1993, by quarter).

	1991				1992				1993	
	Jan-Mar	Apr[1]-June[2]	July-Sept	Oct-Dec	Jan-Mar	Apr-June	July-Sept	Oct-Dec[3]	Jan-Mar	Apr-June
Effort Information										
# Vessels	87	103	73	88	100	108	70	74	96	105
# Sets	947	1,560	1,216	1,335	1,883	2,441	1,148	1,134	1,845	283
Number of Fish Caught										
Swordfish	12,687	13,953	7,395	8,694	19,131	18,259	10,769	13,526	22,209	19,746
Bigeye Tuna	2,805	2,280	3,064	5,302	5,375	6,264	3,721	2,845	8,446	6,732
Yellowfin Tuna	745	1,574	1,927	1,066	1,713	1,313	296	267	2,008	1,762
Blue Marlin[4]	201	587	645	711	204	701	461	138	144	901
Striped Marlin	507	1,628	1,023	1,131	939	2,101	950	405	462	2,525
Mahimahi	1,500	6,670	8,286	3,236	2,631	13,368	20,719	4,278	1,690	7,575
Shark	7,025	8,847	20,939	10,472	16,093	11,639	15,746	30,053	25,082	13,070
Albacore	1,252	1,592	330	4,405	2,938	2.861	338	9,296	2,862	2,978

[1] NWHI closures went into effect 4/15/91
[2] MHI closures went into effect 6/14/91
[3] MHI seasonal closure adjustment went into effect 10/1/92
[4] Blue marlin catch may be overstated and striped marlin catch may be understated due to species identification problems.

The troll fishery

There is little documentation of the gear and methods used in Hawaii's small-vessel troll fisheries, particularly in recent years. Trolling is conducted by towing lures or baited hooks from a moving vessel, using rods and reels typical of big-game fishing, as well as power gurdies, outriggers, and other gear. Troll vessels are mostly small (5-8 m, 15-25 ft long) but some are as large as 18 m (59 ft). Troll vessels are typically operated with a 1-2 man crew. Some larger (20-26 m, 65-85 ft) troll vessels from the North Pacific albacore fishery participated briefly in the Hawaii troll fishery in the mid-1980s. Vessels from the lobster and bottomfish fisheries troll sometimes for pelagic species, as well. Troll vessels generally fish within 20 nm of shore throughout the main Hawaiian islands, although trips to 50 nm are common in the summer.

The troll fishery is composed of several poorly-differentiated sectors including full-time and part-time commercial trollers, commercial charterboats, and recreational and subsistence fishing. The commercial charter sector is often referred to as recreational because its patrons are sport fishermen, but the charter catch is often retained by the vessel and sold. Recreational and subsistence fishermen sometimes operate commercially as well, in that they sell some of their catch.

The pelagic handline fishery

Several types of pelagic handline fishing are practiced in Hawaii, but only the night-handline method is well-described (Yuen 1979, Ikehara 1981). Night-handline or "ika-shibi" fishing developed from a squid (ika) fishery which switched to target the incidental catch of tuna (shibi). Ika-shibi fishermen use lights and chum to attract small prey species and tuna to handlines baited with squid. Handline fishing during the day is called "palu-ahi" or "drop stone" fishing. It differs from the ika-shibi method; the handline is wound around a stone with a baited hook and chum wrapped in the line with the stone (Rizzuto, 1983). The line is tied in a slip knot, and the bundle is dropped to about 20-30 m (depth may vary more widely) and then jerked to untie the knot. This releases the baited hook and chum at the target depth.

The ika-shibi fishery was started by Japanese immigrants to Hawaii and the palu-ahi fishery has prehistoric origins. Both these methods are steeped in tradition and are a treasured part of Hawaii's cultural heritage. Handline fishing is still a source of subsistence for vanishing Hawaiian fishing villages such as Milolii on the island of Hawaii, and is popular among recreational fishermen as well, who often use the method around state-funded fish aggregating devices (FAD) buoys.

Handline vessels are mostly 6-9 m in length with a crew of 1-2 persons. Handline fisheries primarily operated along the coast of the Island of Hawaii until the 1980s when they were revitalized on the other islands in response to an increasing market and better air shipment facilities for fresh fish. Longline and troll vessels will occasionally use handlines if they locate suitable aggregations of fish.

Fishing is often conducted within a few miles of shore at natural "ahi koa", or artificial FAD buoys where yellowfin and bigeye tuna aggregate. In the late 1980s and 1990s, several of the largest handline vessels began fishing around seamounts and weather buoys 100-200 miles from shore. Other variations of handline fishing are not well documented, and only in the last few years do commercial handline catch reports identify what type of handline fishing method was used. For this reason, handline catch and effort data for palu-ahi, ika-shibi, and other types of handline gear are combined in the discussion below.

Some handline fishermen worry that too many new handline fishermen may be impacting the locally-available resource. There is also concern that the new, offshore fishery harvests too many small fish. The WPRFMC has instituted a control date for this fishery with regard to possible limited-entry management.

Other fisheries

Foreign fisheries are currently not authorized to operate in the Hawaii EEZ. Legal foreign longline and pole-and line fishing ceased in 1980 and 1993, respectively, as foreign operators declined to apply for permits and carry US observers as required by the FMP (WPRFMC 1986, Amendment 5). No concerted purse-seine fishing, other than government-sponsored trials, has taken place in the Hawaii EEZ, largely because large surface schools of yellowfin tuna are uncommon and skipjack tuna schools proved difficult to target. Purse-seine methods are improving, however, allowing seiners to effectively fish new areas. In 1990, US purse seiners were reported to be fishing in the US EEZ around Howland and Baker Islands. The possible use of purse-seine gear in Hawaii concerns Hawaii fishermen because in other areas a single set may harvest as much as 200 t of tuna. This is about half of the annual tuna harvest of the entire Hawaii commercial troll fishery.

III.C.1.b. Trends in catch and effort, by gear type

Hawaii longline landings time series (Fig. III-2 and Fig. III-3) are based on four data sources and a correction to account for under-reporting. Hawaii Department of Aquatic Resources (HDAR) longline data are believed to be relatively complete through 1978. NMFS estimates based on market sampling are used for 1987-90 and market sampling combined with logbook data are used to estimate landings for 1991-1992 (Ito 1992, Pooley 1993b). Because of under-reporting discovered in the mid-1980s, total longline catch estimates for 1979-86 are values interpolated between HDAR reported landings in 1978 and NMFS estimates for 1987 (Pooley 1993b). HDAR troll and handline landings reported to HDAR through 1992 (Fig. III-2 through III-4) are similar to NMFS estimates (Pooley 1993b) and are used uncorrected. However, troll and handline landings may also be vastly under-reported and these "best available data" are inadequate to properly monitor Hawaii's pelagic fisheries.

Catch by gear type

Early growth of Hawaii's longline fishery peaked in the mid 1950s and then declined during the 1960s and 1970s when foreign longline catches within the EEZ became greater than domestic landings (Boggs and Ito 1993). A desire to regulate this foreign fishery provided the original impetus for the FMP. Foreign longline catch in the EEZ reached a peak of about 11.2 million lbs in 1970 (Yong and Wetherall 1980). The domestic fishery expanded in the 1980s, surpassing its 1954 record catch of 4.4 million lb by 1988 and surpassing the foreign catch record for the EEZ in 1990. By 1992, landings reached 21.2 million lb (Fig. III-2A).

The longline catch has been was 19.6 million lb and 21.2 million lb in 1991 and 1992, respectively. About half of the catch is swordfish, a species unimportant to any other fishery sector. The non-swordfish component of the longline catch in 1991 was about 9.7 million lbs, exceeding all previous levels (Table III-8). In 1993, non-swordfish catch was 8.6 million lb.

The commercial troll and handline fisheries experienced rapid growth in the 1970s, and declined in the late 1980s (Fig. III-2B). The domestic longline fishery on the other hand was growing rapidly in the late 1980s. This raised concerns regarding catch competition and fishery interactions (Boggs 1991; Ito 1991; Boggs 1993). Reported commercial troll catches (all species) were less than 0.4 million lb/yr until 1974. From 1975-84 commercial troll catches ranged between 1.2-1.7 million lb/yr and then rose to a record peak of almost 3.7 million lb in 1987, declining thereafter (Fig.III-2A,B). Annual commercial handline landings reported to HDAR increased from 0.1 million lb to almost 2.2 million lb between 1970 and 1981. Since 1981 commercial handline landings have ranged between 1.1-2.2 million pounds with major peaks in 1981, 1983, 1986, and 1991 (Fig.III-2B).

The recently expanded Hawaii longline fishery (Fig. III-3A,B) now accounts for the bulk of Hawaii's pelagic catch including most of the swordfish (12.6 million lb, >99%), bigeye tuna (3.2 million lb, 95%), albacore (0.8 million lb, 87%), striped marlin (1.1 million lb, 93%), blue marlin (0.7 million lb, 56%), and mahimahi (0.6 million lb, 53%) caught in 1992 (Table III-8). The longline fishery also catches substantial amounts of yellowfin tuna (0.8 million lb). The longline catch of yellowfin tuna, blue marlin, and mahimahi creates a potential for fishery interaction between the longline fishery and the small-vessel troll and handline fisheries that target these species. Until the early 1970s and for a brief period (1989-91) before the enactment of the moratorium on entry and area closures, Hawaii's longline fleet accounted for the majority of the reported yellowfin tuna catch. Since then, Hawaii longline catches of yellowfin tuna have declined (Fig.III-3B), and now account for 26% of the total Hawaii catch (Table III-5).

Yellowfin tuna is a secondary target species for longline fishermen, and blue marlin and mahimahi are incidental catches, but the species composition of longline landings has changed over time. During 1951- 64, more than half of longline landings (by

Table III-8. Hawaii longline fishery landings (1000 lb) and Revenue ($1000).[1]

Species	Landings (1000 lb)		Revenue ($1000 lb)	
	1991	1992	1991	1992
Tunas				
Albacore	700	780	$ 900	$ 970
Bigeye	3,500	3,280	12,500	11,910
Yellowfin	1,600	770	4,300	2,310
Other tuna	100	102	100	680
Billfish				
Blue Marlin	700	730	500	870
Swordfish	9,900	12,640	22,000	24,270
Striped Marlin	1,400	1,060	1,400	1,360
Other billfish	400	280	300	300
Other Pelagics				
Mahimahi	500	590	700	830
Wahoo (ono)	100	80	200	200
Sharks	200	560	100	350
Misc.	500	370	700	600
TOTAL	19,600	21,240	$43,700	$44,650
Total less swordfish	9,700	8,600	$21,700	$20,380

[1] 1991 data from Dollar (1992) and Ito (1992). 1992 data from Dollar (1993) and NMFS shoreside monitoring program.

Figure III-2A. Hawaii pelagic commerical landings, by gear type, 1970-1992. HDAR summary and NMFS Estimates.

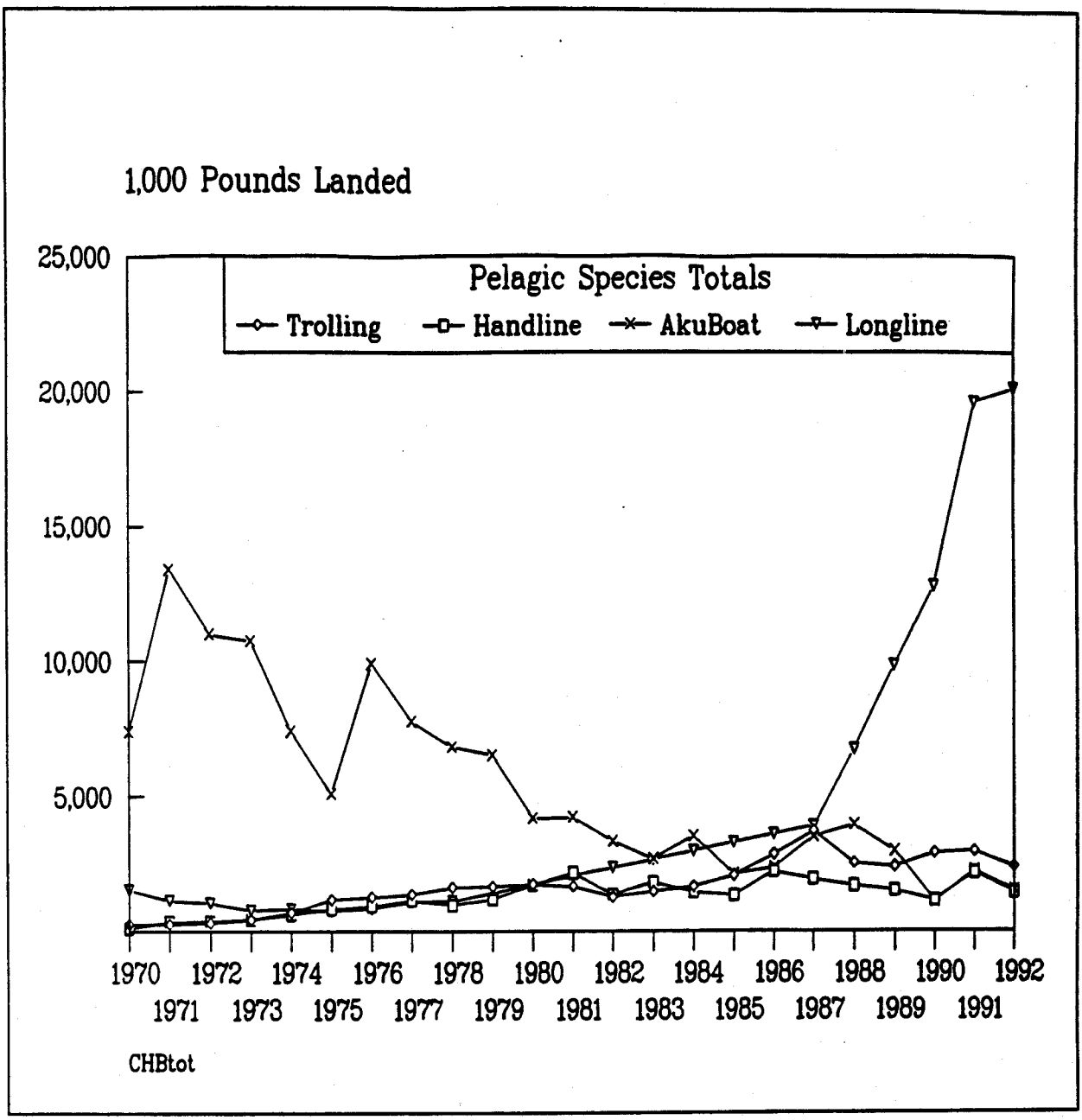


Figure III-2b. Hawaii troll and handline pelagic commercial landings, 1990-1992 (Longline and aku boat excluded to show annual variation).

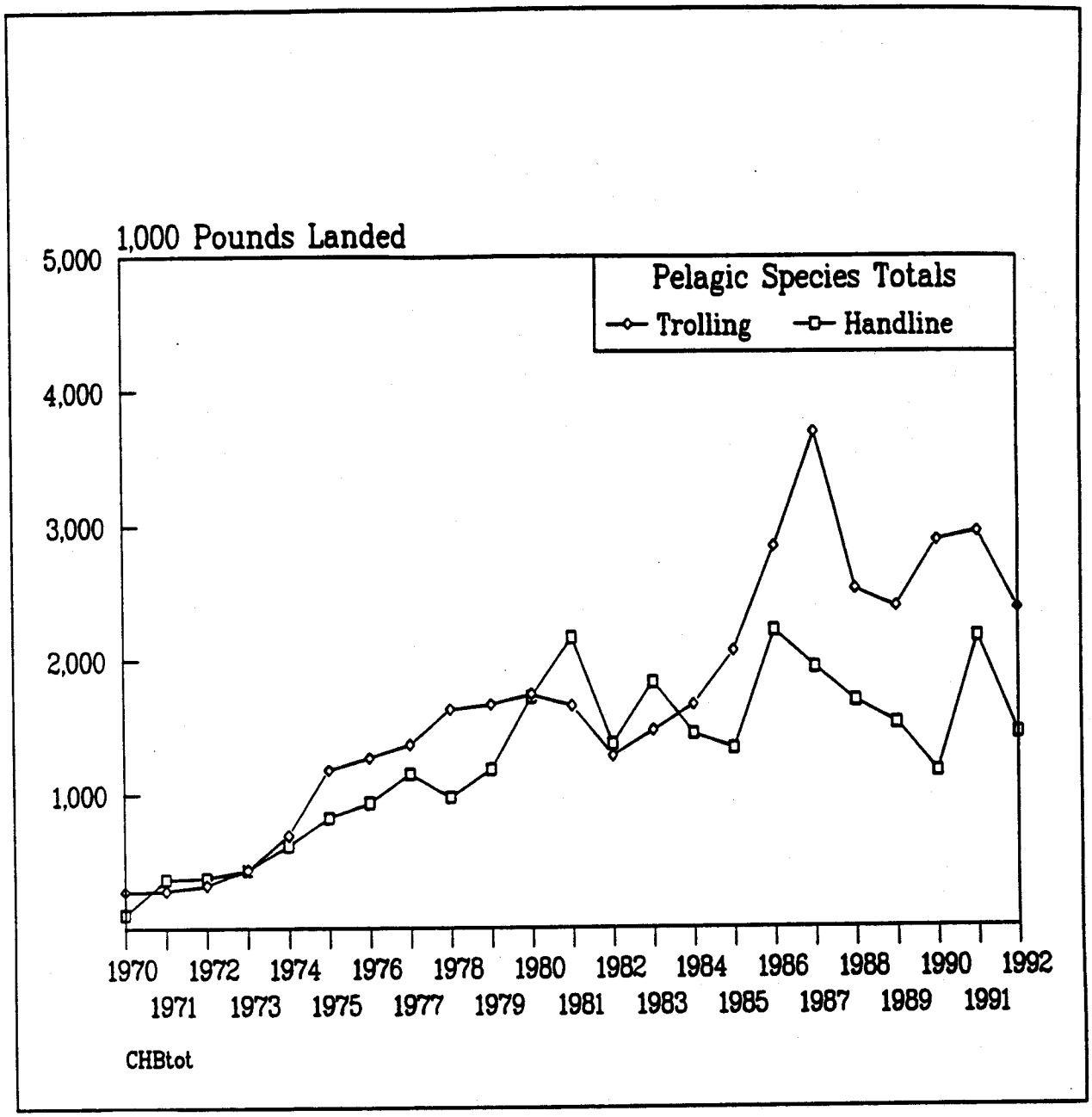


Figure III-3a. Hawaii longline landings, by species, 1970-1992. NMFS estimates.

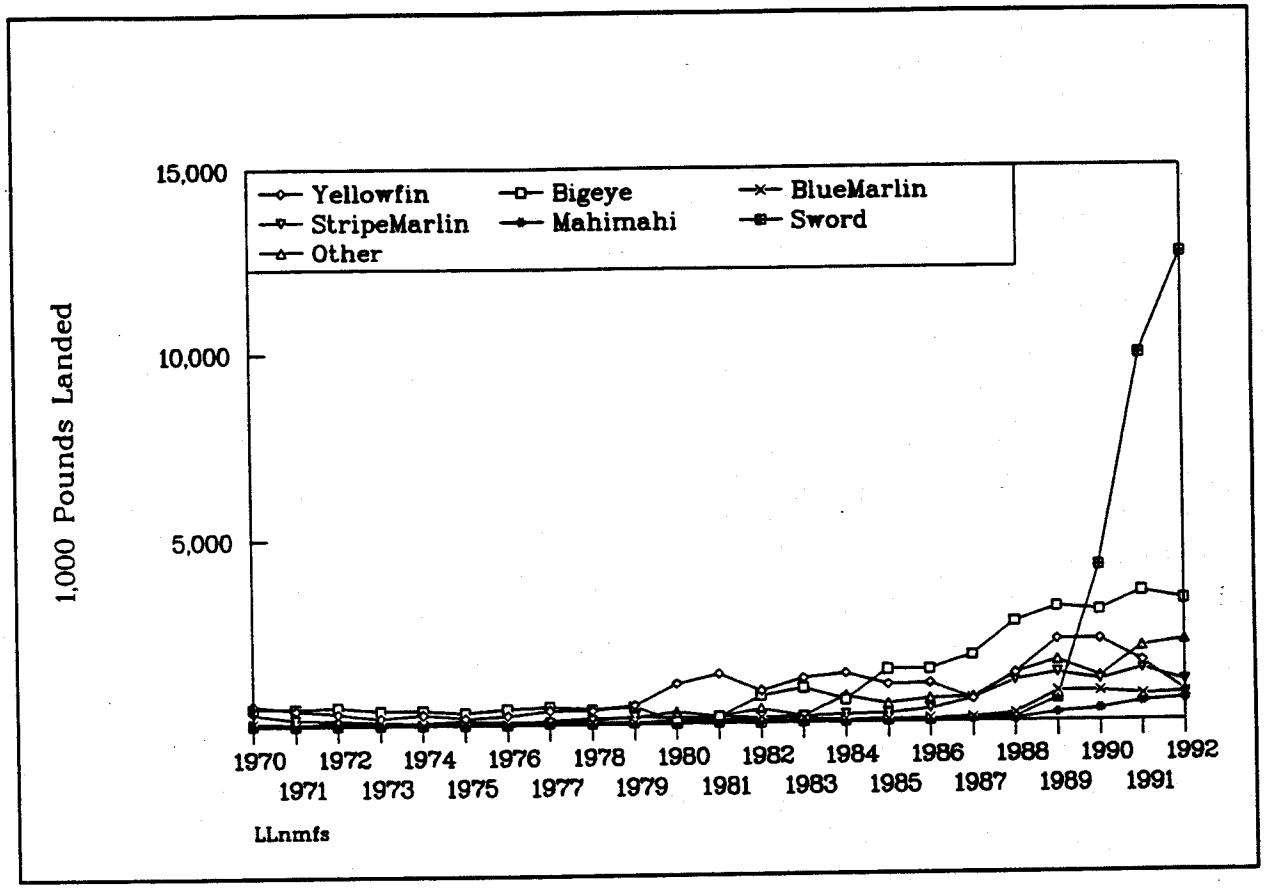
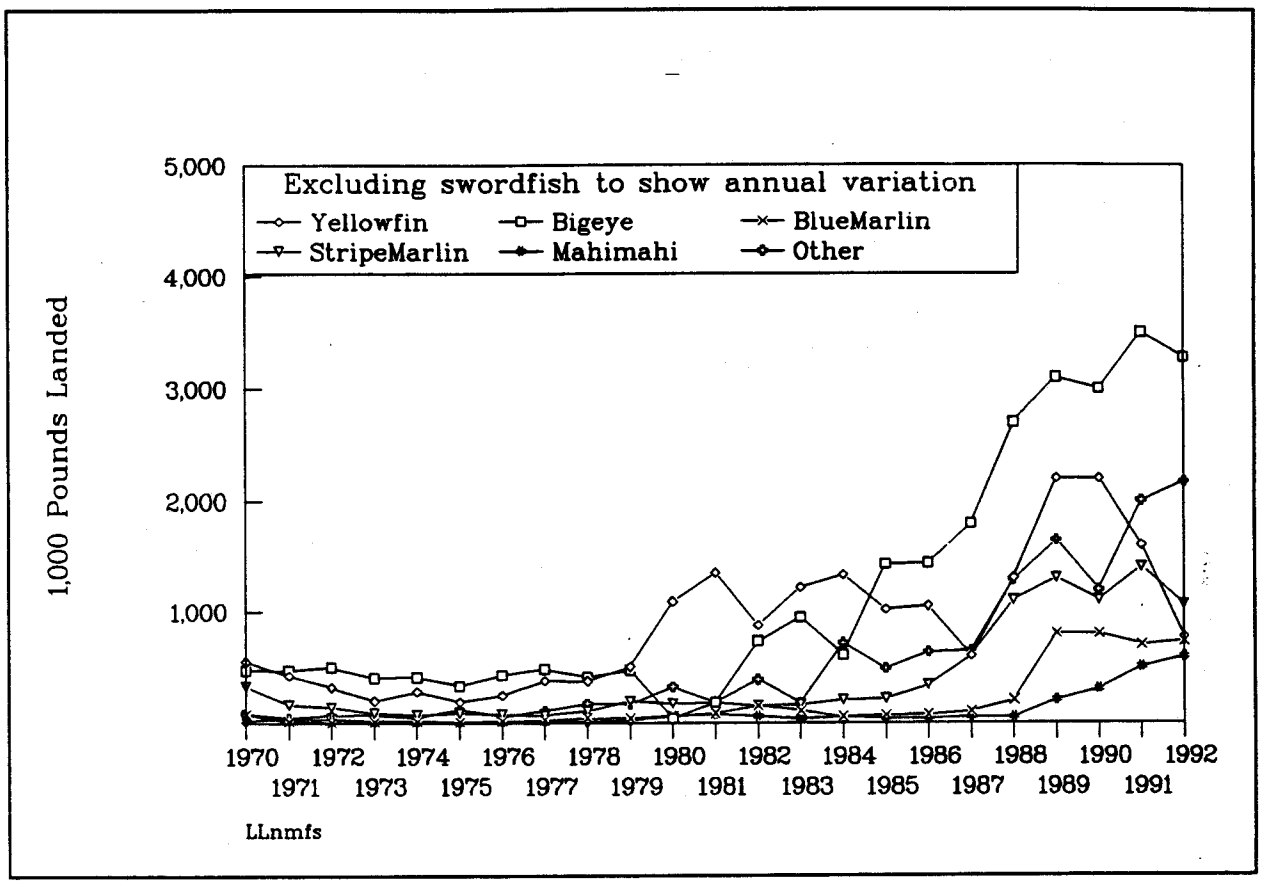


Figure III-3b. Hawaii longline landings, 1970-1992. Swordfish excluded to show annual variation. NMFS estimates.



weight) were bigeye tuna, but before 1950 and in the 1970s, yellowfin tuna made up roughly equal proportions of the catch. The proportion of blue marlin was higher than striped marlin in the early 1950s, but striped marlin became more predominant from the early 1960s to the present (Boggs and Ito, in press). These trends, and the switch to swordfish in the 1990s, illustrate the potential for the longline fishery to impact different resources as markets and fishing methods change.

Yellowfin tuna are the primary target of the commercial troll and handline fleets which landed 0.6 million and 1.5 million lb, respectively, of yellowfin tuna in 1992 (Figs III-4A and III-4B). The 1987-1989 decline by the troll fishery (Fig. III-4A) and the 1986-90 decline in yellowfin tuna catch by the handline fishery (Fig. III-4B) coincided roughly with the rapid expansion of the longline fishery, and many people perceived the longline expansion as a cause for the decline (Boggs 1991). The subsequent pattern of yellowfin tuna catches in these fisheries has been variable. The troll catch of yellowfin tuna increased somewhat in 1990 and was lower again in 1991-1992. The handline rebounded in 1991 through 1992.

The commercial troll/handline fishery caught a substantial fraction of the blue marlin (0.6 million lb 41%), and most of the wahoo (79%) caught in 1992 (Table III-9). Commercial troll landings of species other than yellowfin tuna have remained relatively constant (compared with yellowfin tuna) since 1987 (Fig III-4A), except for mahimahi which increased through 1991 and dropped in 1992. The commercial handline catches of species other than yellowfin tuna appear minor (Fig.III-4B), but the handline catch described as yellowfin tuna includes an unknown amount of bigeye tuna mis-categorized as yellowfin tuna during the reporting and processing of the data. The confusion is partially due to the common name "ahi" which can mean either yellowfin or bigeye tuna. The handline catch of bigeye tuna would be among the most likely to be affected by catch competition with the longline fishery. However, there are currently no good estimates of handline catch or CPUE for bigeye tuna. Catch competition for bigeye tuna will remain unquantified unless data collection procedures are improved.

State of Hawaii (HDAR) commercial catch reports used for this summary do not identify types of troll or handline fishing (i.e., charter, part-time commercial) and there are no current estimates of the magnitude of recreational or subsistence harvest. In 1976, the troll catch by sector was estimated at 21% charter, 44% part-time commercial and recreational-subsistence (combined), and 35% full-time commercial (Cooper and Adams 1978). However, changes in troll fisheries make it unlikely that these proportions represent the current situation. The catch of these unquantified sectors is probably significant with regard to catch competition and fishery interaction.

Figure III-4a. Hawaii troll pelagic landings, by species, 1970-1992. HDAR summary files.

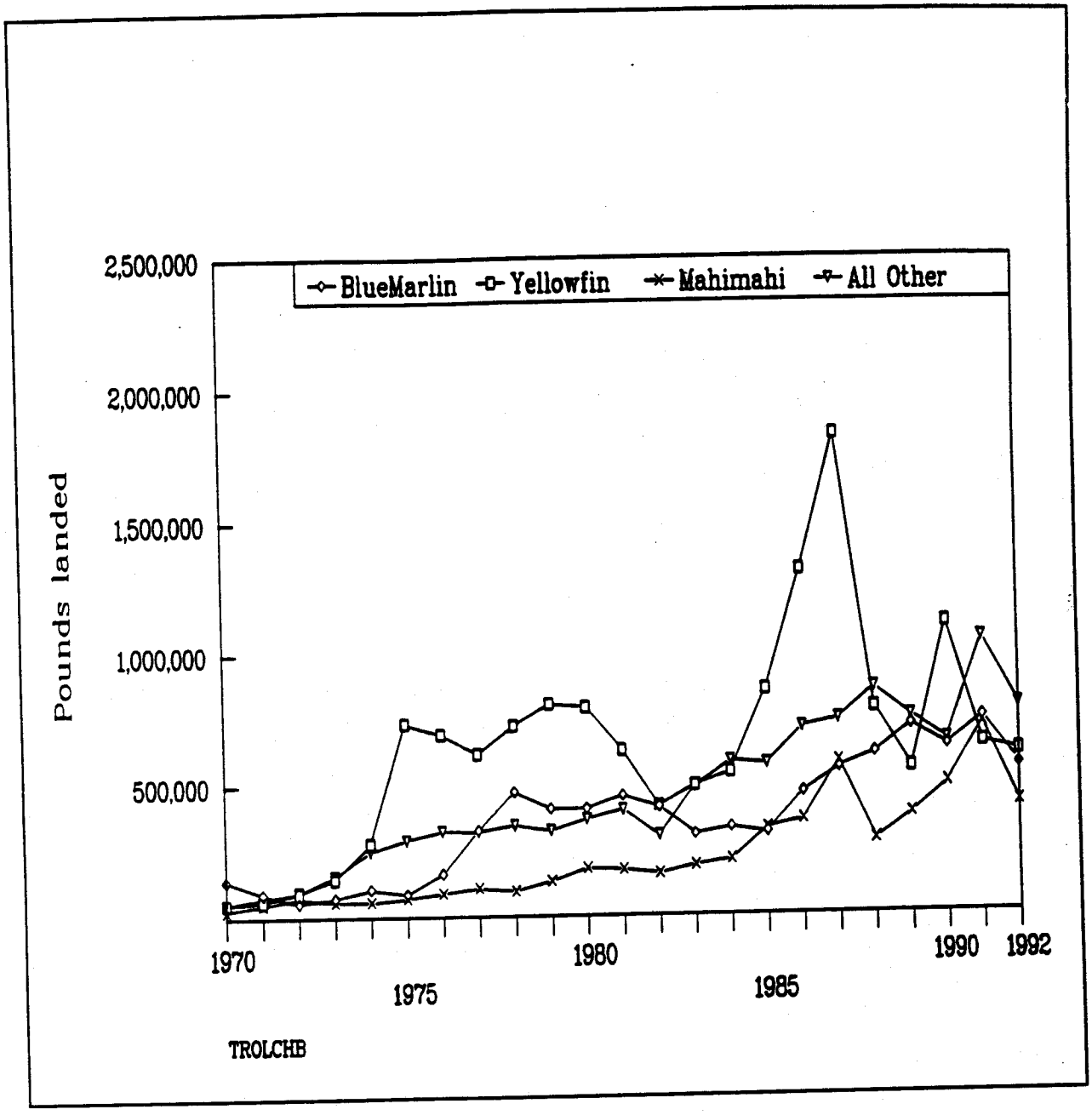


Figure III-4b. **Handline pelagic landings, by species, 1970-1992. HDAR summary files.**

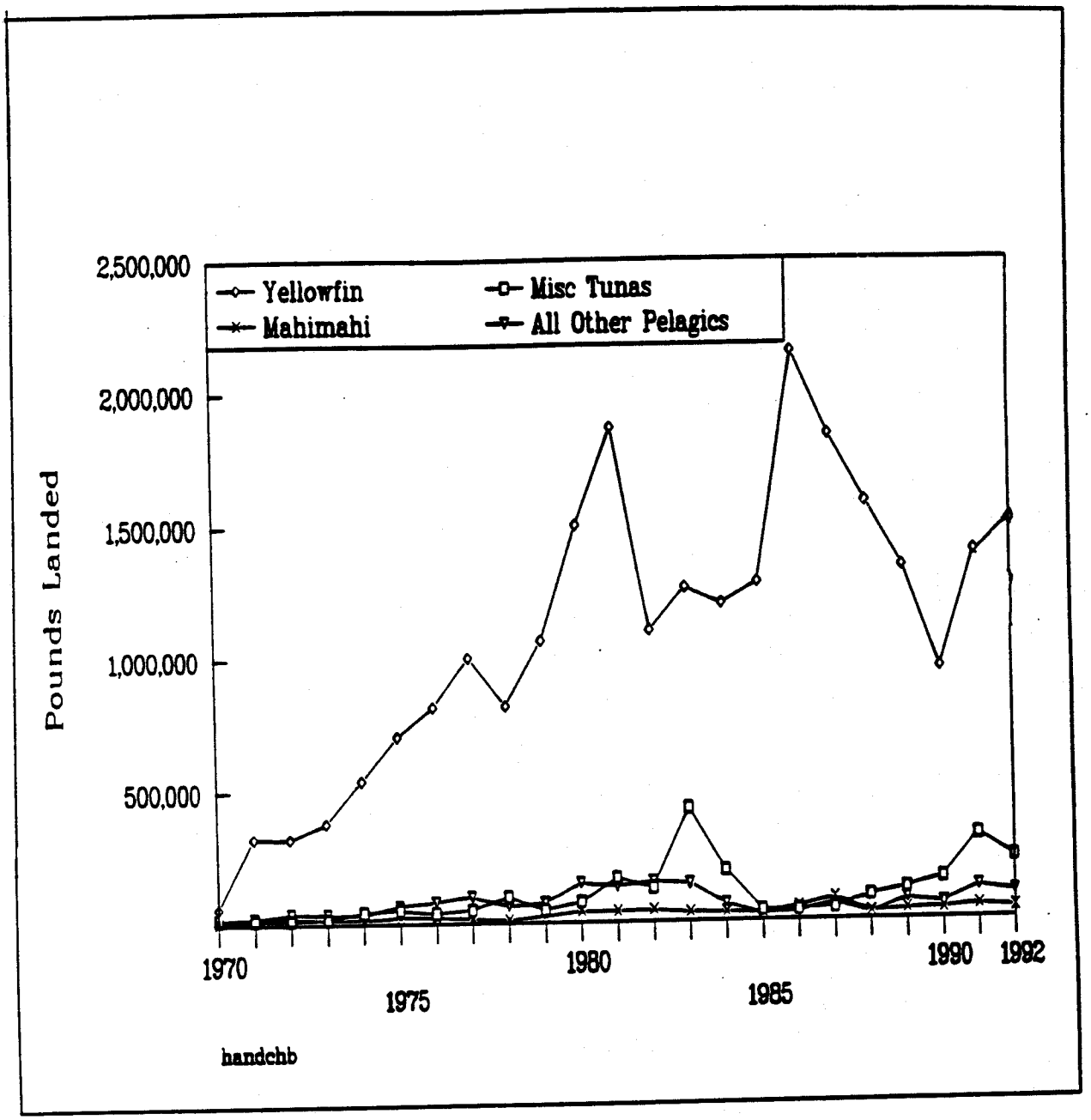


Table III-9. Non-longline pelagic commercial landings & revenue 1991-1992. HDAR commercial fisheries data for pelagic species only, excluding longline-caught fish.

Species	1991				1992			
	Pounds	Lb Sold	Revenue	Price/lb	Pounds	Lb Sold	Revenue	Price/lb
Skipjack Tuna	2,711,577	2,585,473	$3,408,314	$1.32	2,052,926	1,938,538	$2,737,147	$1.41
Yellowfin Tuna	2,113,378	2,008,873	3,803,129	1.89	2,219,498	2,112,449	3,912,901	1.85
Bigeye Tuna	178,362	166,948	298,626	1.79	183,482	176,207	279,947	1.59
Albacore	158,362	154,099	142,864	.93	115,889	113,963	111,947	.98
Other Tunas	20,968	13,911	19,061	1.37	28,508	21,823	29,516	1.42
Billfish	51,605	39,789	40,936	1.03	36,362	29,559	38,913	1.32
Swordfish	13,627	13,529	28,909	2.14	3,238	3,179	9,107	2.86
Blue Marlin	769,051	642,878	524,040	.81	574,532	489,022	441,330	.90
Sailfish	2,762	1,597	1,795	1.12	1,001	689	681	.99
Striped Marlin	90,440	67,640	80,624	1.19	84,844	65,176	87,916	1.35
Mahimahi	781,045	712,466	1,387,276	1.95	529,438	485,446	1,138,659	2.35
Wahoo	381,891	346,662	861,486	2.49	299,609	268,157	785,000	2.85
Sharks	22,154	5,338	4,003	.75	13,849	4,218	3,645	1.35
Other Pelagics	7,825	7,037	11,101	1.58	9,953	9,270	13,145	1.42
All Species	7,304,531	6,768,200	$10,614,165	$1.57	6,151,129	5,717,696	$9,569,386	$1.67

Fishing effort by gear type

Documenting the number of vessels that participated historically in the Hawaii longline fishery is difficult. Reported participation declined from 42 vessels in 1952 to 20 in 1970 (Yoshida 1974), and to 15 in 1977 (Yuen 1977). By 1983, HDAR records showed only 13 registered longline vessels, more longliners were actually fishing. During the 1980s, many longliners did not submit their state commercial catch reports. The federal logbook and permit system was implemented in the 1990s which led to much better documentation of longline activity. The NMFS Market Monitoring Program found that participation in the Hawaii longline fishery more than doubled from 37 vessels in 1987 to 80 in 1989, and then increased by an additional 73% to 138 vessels in 1990. The first full year of the moratorium was 1991. During that year, 72% of the permits issued (111 out of a total of 154) actively fished in the Hawaii longline fishery. In 1992, 123 permits (74% of the total 166 issued) actively fished.

Deployment of increasing numbers of hooks per set and per trip has characterized the history of the Hawaii longline fishery (Boggs and Hawn, unpublished manuscript). The number of hooks deployed during an average trip nearly doubled between the 1950s (Shomura 1959) and the early 1980s (Hawaii Opinion 1984). Longline vessels deployed over three times as much gear on an average trip in 1988 as in 1982, and users of the new monofilament longline systems tended to deploy over four times as much gear per trip in 1988 (Kawamoto et al. 1989) as was typical of the fleet in 1982 (Hawaii Opinion 1984).

The amount of gear deployed per set and per trip varies depending on the type of longline trip. When fishing for swordfish longliners use between 35-45% fewer hooks per set than when fishing for tuna in 1992 (Table III-10). For a given target fishery, size of vessel does not appear to affect the number of hooks which can be deployed per set. The amount of effort expended per trip (hooks per trip) does not vary much with the size of the vessel when fishing closer to the islands for tuna (Table III-10), but the larger boats (over 74 ft.) targeting distant water swordfish deployed 11,249 hooks/trip, while mid-size vessels (56 to 74 ft in length) deployed 8, 164 hooks/trip on average during 1992.[3]

To estimate longline fishing effort, published data on the changes in the amount of gear deployed per longline trip are combined with estimates of the number of longline fishing trips[4] (Boggs and Hawn, unpubl.) to derive the annual number of total hooks deployed (Fig III-5). Longline fishing effort increased throughout the 1980s until the

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[3] Information from longline logbook reports for the period 1 October 1991 through 30 September 1992.

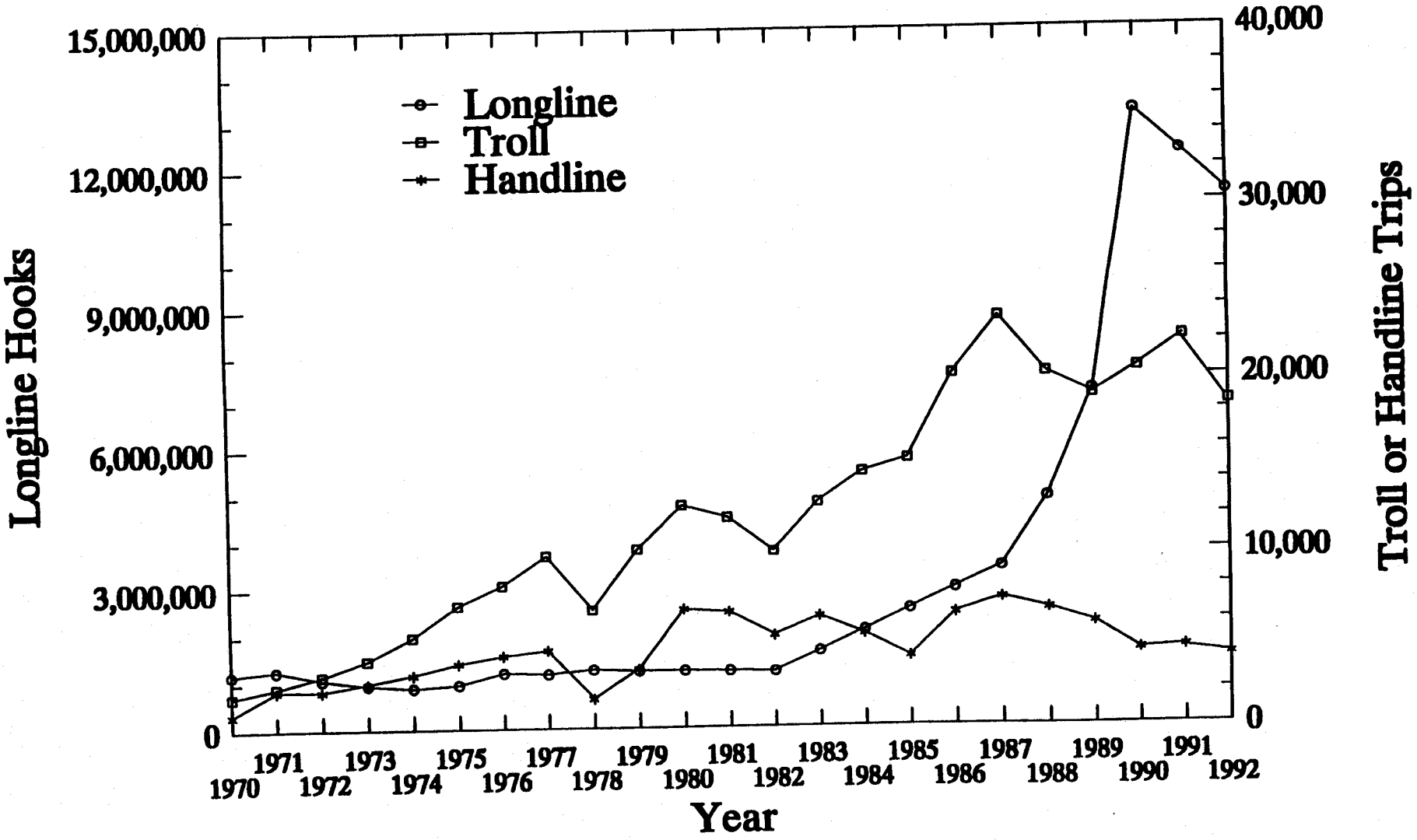
[4] Longline trips from 1979-86 were estimated by interpolation between HDAR data for 1978 and NMFS estimate for 1987.

Table III-10. Average number of hooks deployed (per set, per trip) by vessel size category.

Type of Trip	Vessel Size Category	Average Hooks/Set		Average Hooks/Trip	
		1991	1992	1991	1992
All trips combined	Large[1]	871	886	7,550	9,721
	Medium[2]	986	1,017	7,028	8,218
	Small[3]	1,149	1,248	7,541	9,827
Swordfish Target	Large	774	831	8,948	11,249
	Medium	725	759	6,926	8,164
	Small	657	*	5,911	*
Tuna Target	Large	1,060	1,285	7,896	11,706
	Medium	1,213	1,371	9,918	11,595
	Small	1,282	1,345	9,339	10,878
Mixed	Large	902	893	6,734	8,237
	Medium	924	894	5,432	5,932
	Small	928	875	3,823	4,666

[1] >74 ft in length
[2] 56-74 ft
[3] <56 ft
* confidential data, less than 3 vessels reporting

Figure III-5. Hawaii pelagic fishing effort, 1970-1992. NMFS and HDAR data.



moratorium on new participants in the fishery was established; longline effort then declined in 1991-92. Longline fishing effort that is known to be directed at swordfish[5] accounted for about 24% of total hooks in 1992, with 45% directed at tuna and the remainder directed at mixed or unknown targets. In 1991 hooks were 19% swordfish-directed, and 43% tuna-directed. About 30% of the effort categorized as directed at mixed or unknown targets used lightsticks, presumably to target swordfish (NMFS longline logbook summaries).

There were 102 and 119 charter vessels in the Hawaii troll fishery in 1976 and 1982, respectively (Cooper and Adams 1978, Samples et al. 1984), compared to an estimated 160 full-time commercial, and 1,544 part-time and recreational-subsistence trollers (combined) in 1976 (Cooper and Adams 1978). More recent counts of participation by sector are not available, but it is likely that all sectors have changed.

The only estimates of fishing effort for the commercial troll and handline fisheries are based on counts of records for unique landing dates by vessels (Boggs and Ito, in press). Fishing effort in the Hawaii commercial troll fishery showed an increasing trend from 1970-87, dipped in 1988-90, and then rose again in 1991 to the record high level set in 1987 (Fig III-5).

Surveys of the ika-shibi fishery showed participation growing from 30-40 boats in 1976 to at least 230 boats by 1980 (Yuen 1979, Ikehara 1981). A similar number of handline fishermen (palu-ahi and ika-shibi combined) are currently active in the fishery, but there is now a larger component of the handline fishery that does not report their effort or catch. Estimates of total trips by handline vessels (all types) increased from 1970-77 with a notable dip in 1978-79. Peaks of about 7,000 trips annually were reached in 1980-81 and 1986-88 with a subsequent decline to about 4,000 trips annually in 1990-92.

The total effective effort by all fishing gears combined would be a very useful statistic for describing the fishing pressure on the locally available resource, but no such estimate is available given the present data collection environment in Hawaii. The three major gear categories have very different efficiencies for each species, and these efficiencies change with time. It may be possible to approximate some measure of total fishing effort through a thorough analysis of the historical data as proposed for the Western Pacific Pelagic Fisheries Research Program. Meanwhile, the only available index of fishing pressure is the total catch of each species (Boggs 1991, in press), which is given below[6].

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[5] Hooks deployed on trips defined as swordfish, mixed, or tuna-directed, as defined by fishermen in terms of target species.

[6] Total catch data for Hawaii fisheries are only valid as a fishing pressure index after 1980, since they do not include the foreign catch in the EEZ for earlier years. This index also lacks the non-commercial component, which if substantial and independent of the trend in commercial effort would invalidate the index. Information on the magnitude of non-commercial (recreational and subsistence harvests which are not sold) catch and effort is needed for rational management.

III.C.1.c. Trends in commercial revenue, by gear type

The Hawaii pelagic fisheries land approximately 70% of total commercial fishery revenue (ex vessel) in Hawaii and also account for a large proportion of total recreational and sports fishing income. Figure III-6 provides inflation-adjusted (1992 dollars) ex-vessel revenue for the four main pelagic gear types from 1970 to 1992.[7] Pelagic fishery revenue has grown from $3 million in 1970 ($12 million in inflation-adjusted 1992 dollars) to $54 million in 1992. The pelagic fishery has been dominated by two gear types: in the early 1970s the aku boat (skipjack tuna) fishery provided 52% of the revenue (declining to 4% in 1992), while in 1992 the longline fishery provided 82% of the pelagic fishery value (rising from just 17% in 1976). However in the interim, the troll and handline fisheries have also played an important part.

Aku boat landings have declined primarily because of the closure of the Honolulu cannery in 1984, problems in catching live bait, and the aging of the vessels in the 50 plus year old fleet. Troll and handline revenue rose from 5% of total pelagic value in 1970 to 41% in 1986. Actual revenues in the troll and handline pelagic fisheries remained stable from the mid-1970s through the mid-1980s, peaking at $12.6 million in 1987 (inflation-adjusted to 1992 dollars) and declining to $7.1 million in 1992. Most of the growth in the longline fishery is attributable to the increase in swordfish landings (54% of longline revenue in 1992, up from less than 1% in 1987).

III.D. 1.d Trends in catch and CPUE by species

In this section catch and CPUE are examined for evidence of declines in CPUE caused by increased local fishing pressure. As noted above (Section III.D.1.b) the only available measure of local fishing pressure is the total estimated catch of each species (by all fisheries combined).

When catch competition occurs CPUE should decline as total catch increases (Boggs 1993). However, other factors that affect CPUE may tend to obscure catch competition, and many other factors affect the estimates of CPUE for Hawaii's pelagic fisheries (Boggs, in press; Boggs and Ito, in press).

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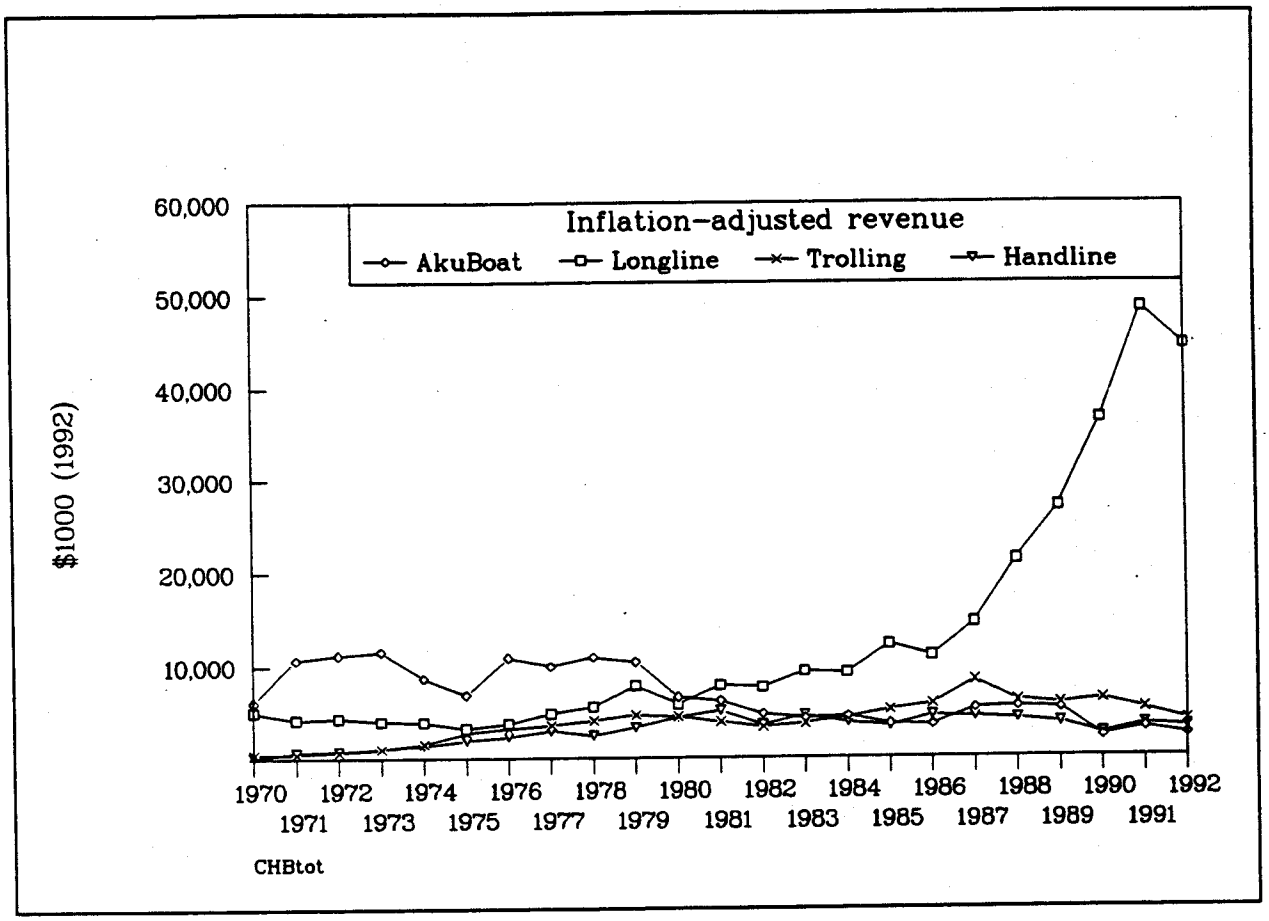
[7] Revenue was estimated by applying Hawaii Division of Aquatic Resources (HDAR) commercial fish catch reports average prices to HDAR figures for aku (bait) boat, troll and handline landings and NMFS estimates of longline landings.

Figure III-6. Hawaii pelagic fishery ex-vessel revenue by gear type, 1970-1992 (1992 dollars). HDAR summary files and NMFS estimates.



The "best available" estimates of total catch and CPUE[8] for important species are presented here despite major problems with the estimates and their interpretation (Boggs 1991, 1993, Boggs and Ito 1993). The types of research needed to improve these estimates and to estimate the optimal level of fishing effort is described in Appendix 2. Funds to initiate these analyses recently became available.

Swordfish

The total swordfish catch increased to the current level of 12.6 million lb from almost nil before 1989. Between 1991 and 1992 swordfish CPUE increased slightly from 2,300 to 2,600 lb/1,000 hooks. The average size of longline-caught swordfish ranged from a low of 119.2 lb in 1988, to a high of 177.9 lb in 1992 (Table III-11). No clear trend can be seen over such a short time[9]

Yellowfin tuna

The catch of yellowfin tuna by all Hawaii commercial fisheries increased 5-fold from 1970 to 1981, declined by 40% in 1982, increased to a record high of about 4.5 million lbs in 1986, remained at a relatively high level through 1990, and then declined by about 30% from 1990-1992 (Fig. III-7).

Yellowfin tuna CPUE[10] in the Hawaii longline fishery peaked in 1970, 1980 and 1989 and declined to near record-low levels in 1991 and 1992 (Fig. III-8). The decline in longline CPUE for yellowfin tuna in 1991-92 may reflect the effect of area closures that kept longliners farther from the islands. The 1991-92 decline in CPUE is not

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[8] Longline catch rates after 1989 have not been estimated previously (Boggs and Ito 1993) because the shift in longline effort to target swordfish drastically altered the efficiency of the gear. To calculate CPUE for recent years, 1991-92 logbook data was summarized for three trip categories: 1) trips known to be targeted at swordfish, 2) trips known to be targeted at tuna, and 3) trips targeted at both or with the target unknown. Effort (hooks) from swordfish trips was used to estimate CPUE for swordfish and effort from tuna trips was used to calculate CPUE for the other species. Mixed/unknown trips were not used to calculate CPUE.

[9] The lack of logbook data before 1991 and the absence of any directed fishery for swordfish prior to 1987 prevents calculating swordfish CPUE for earlier years.

[10] Longline CPUE data from Boggs and Ito (1993) were updated to include 1991-92 longline CPUE calculated as catch per 1,000 hooks for tuna-directed trips. Data through 1989 contain relatively little effort for swordfish and these CPUE were calculated from data on all trips. No longline CPUE was estimated for 1990 due to lack of data on substantial effort directed at swordfish. NMFS longline CPUE data for 1987-1989 are based on NMFS market monitoring data on catch and trips as described in Boggs and Ito (1993). Prior and overlapping CPUE estimates are based on HDAR catch reports. The lack of agreement between overlapping HDAR and NMFS estimates of longline CPUE from 1987-89 is due to differences between in fishery coverage provided by the two data sources. Although NMFS data has almost complete coverage HDAR data are included because of they include a much longer time series.

Table III-11. Average size of fish (lb), by gear type, 1987-1992.

Year	Non-Tuna PPMUS					Tunas			
	Swordfish	Blue Marlin	Striped Marlin	Mahimahi	Wahoo (Ono)	Bigeye Tuna	Yellowfin Tuna	Albacore	Skipjack Tuna
Longline									
1987	129.3	161.4	66.2	21.1	33.3	76.3	81.9	62.3	--
1988	119.2	157.3	56.9	20.0	31.9	83.9	102.5	59.7	--
1989	131.1	164.7	61.5	23.0	34.6	77.0	103.7	62.0	--
1990	147.6	198.4	61.5	18.7	36.0	79.8	121.9	61.2	--
1991	142.4	172.0	55.8	14.5	31.6	85.5	117.2	53.3	--
1992	177.9	166.9	69.1	11.0	35.0	76.7	100.5	48.0	--
Troll and Handline									
1987	--	212.1	67.3	18.8	19.5	19.6	27.6	--	8.9
1988	--	181.6	60.3	17.2	21.1	58.9	31.5	--	11.1
1989	--	185.7	67.9	19.9	20.9	34.0	35.4	--	13.6
1990	--	243.3	74.8	19.1	21.9	25.3	51.6	--	10.6
1991	--	179.2	60.6	13.5	18.8	20.4	26.0	--	14.5

Source: NMFS and HDAR shoreside monitoring program. Average weights are the averages of shoreside monitoring samples. 1992 weights are preliminary estimates; 1992 weights for troll and handline fisheries are not available.

Figure III-7. Hawaii commercial yellowfin and bigeye tuna landings; longline,troll and handline combined, 1970-1992.

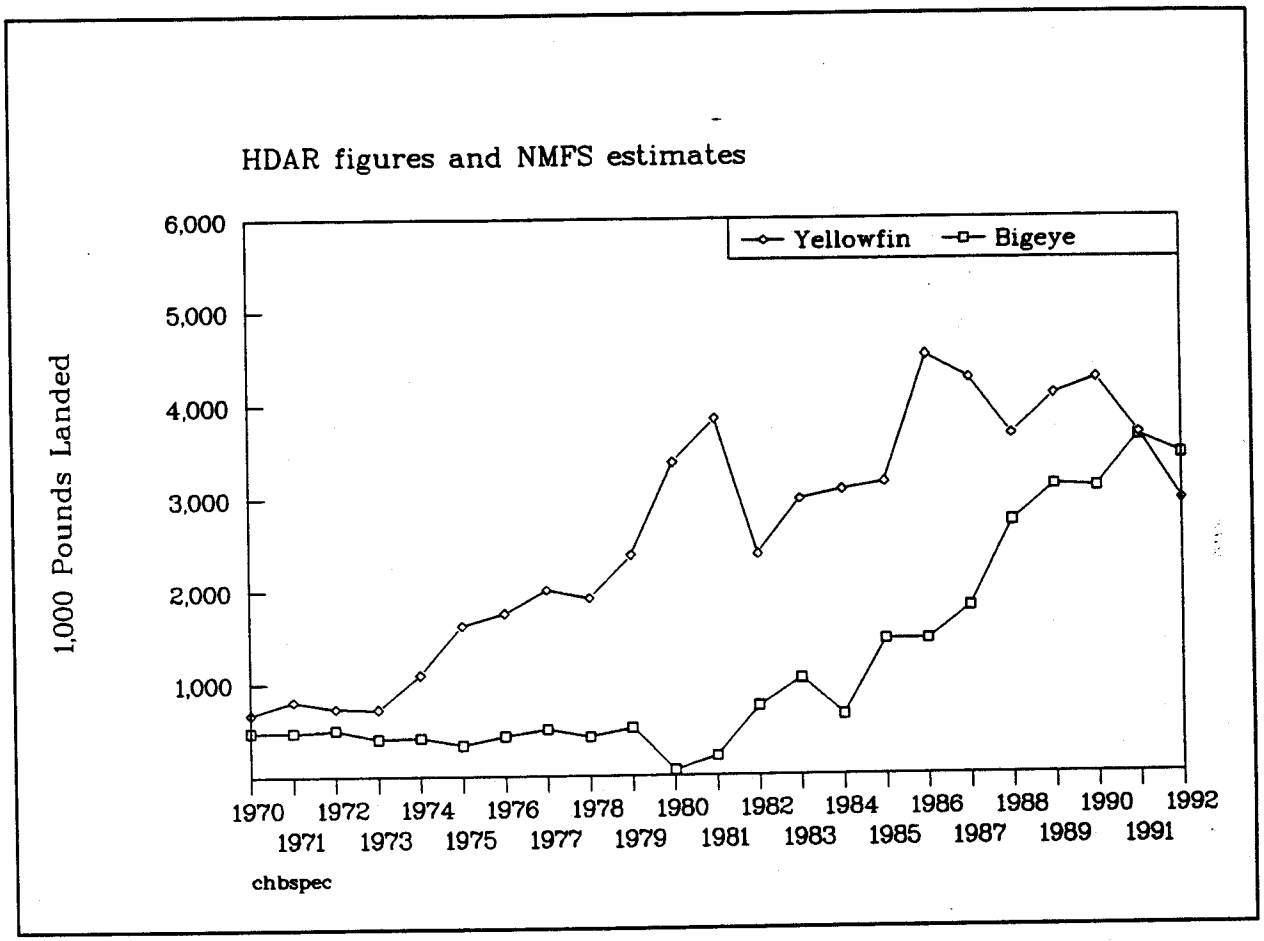
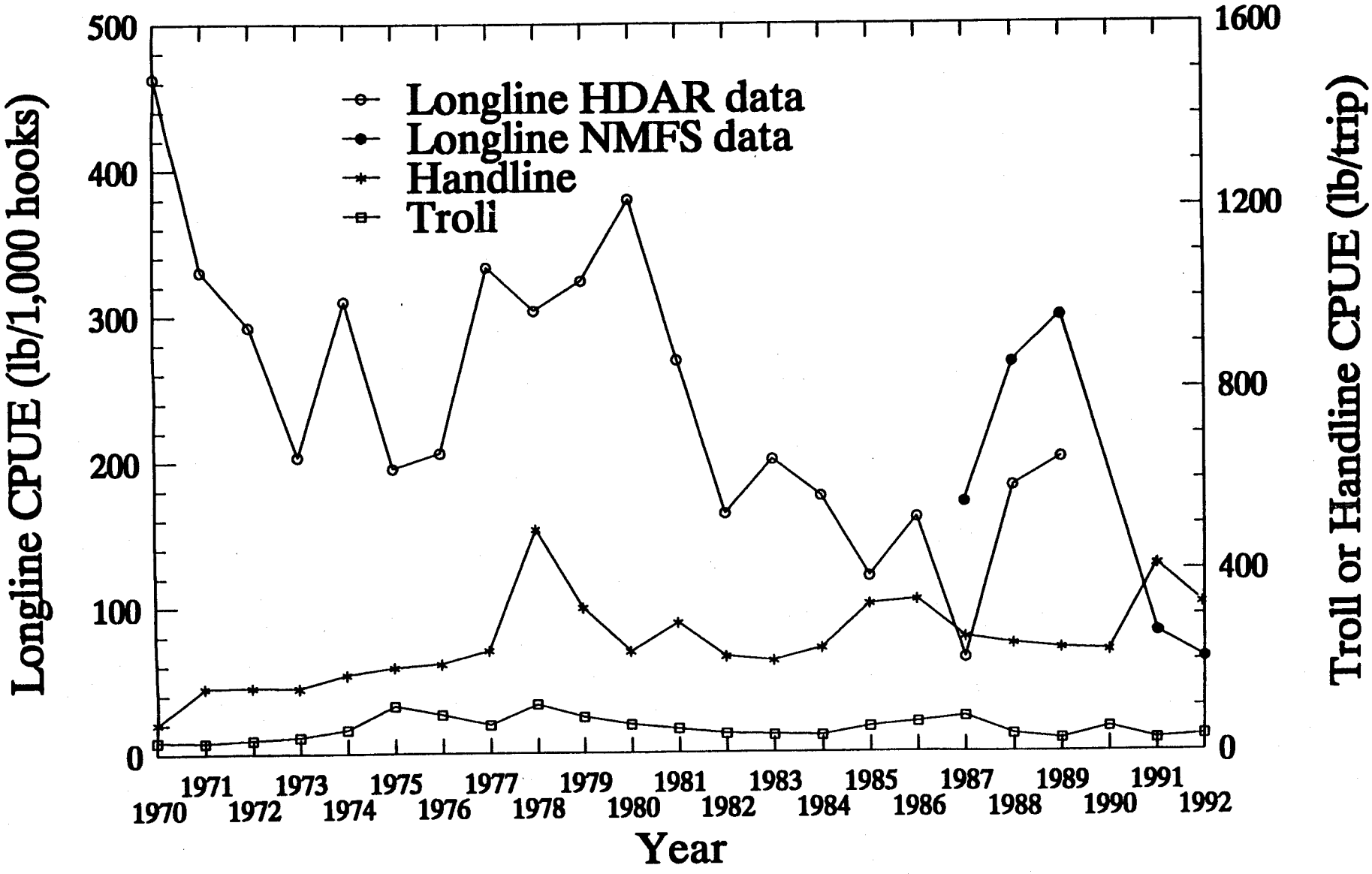


Figure III-8. Hawaii yellowfin tuna CPUE, by gear type. 1970-1992.



associated with an increase in fishing pressure (estimated as total catch rather than effort) on yellowfin (Fig.III-7). Yellowfin tuna appear to be more abundant near the islands than in the surrounding ocean (Murphy and Shomura 1972).

A previous decline in longline CPUE occurred in the early- to mid-1980s and may have reflected a change to deeper gear configuration, reducing the efficiency of the gear for yellowfin tuna. The decline was also associated with the increase in total landings of yellowfin during this period, suggesting catch competition. However, if the local abundance of yellowfin tuna decreased from 1980-1987 due to fishing pressure, one would expect to see that decline in CPUE indices for other gear types, but that was not the case (Fig. III-8). Troll CPUE peaked in 1975, 1978 and 1987, while handline CPUE peaked in 1978 and 1985-86. The declines in troll and handline CPUE in the late 1980s occurred while fishing pressure (total catch) was relatively stable. Variation in troll CPUE appears to be related to the abundance or catchability of surface-caught yellowfin tuna over a wider geographic scale perhaps in relation to such environmental anomalies as "El Niño" (Sukuzi, in press a; Boggs, in press).

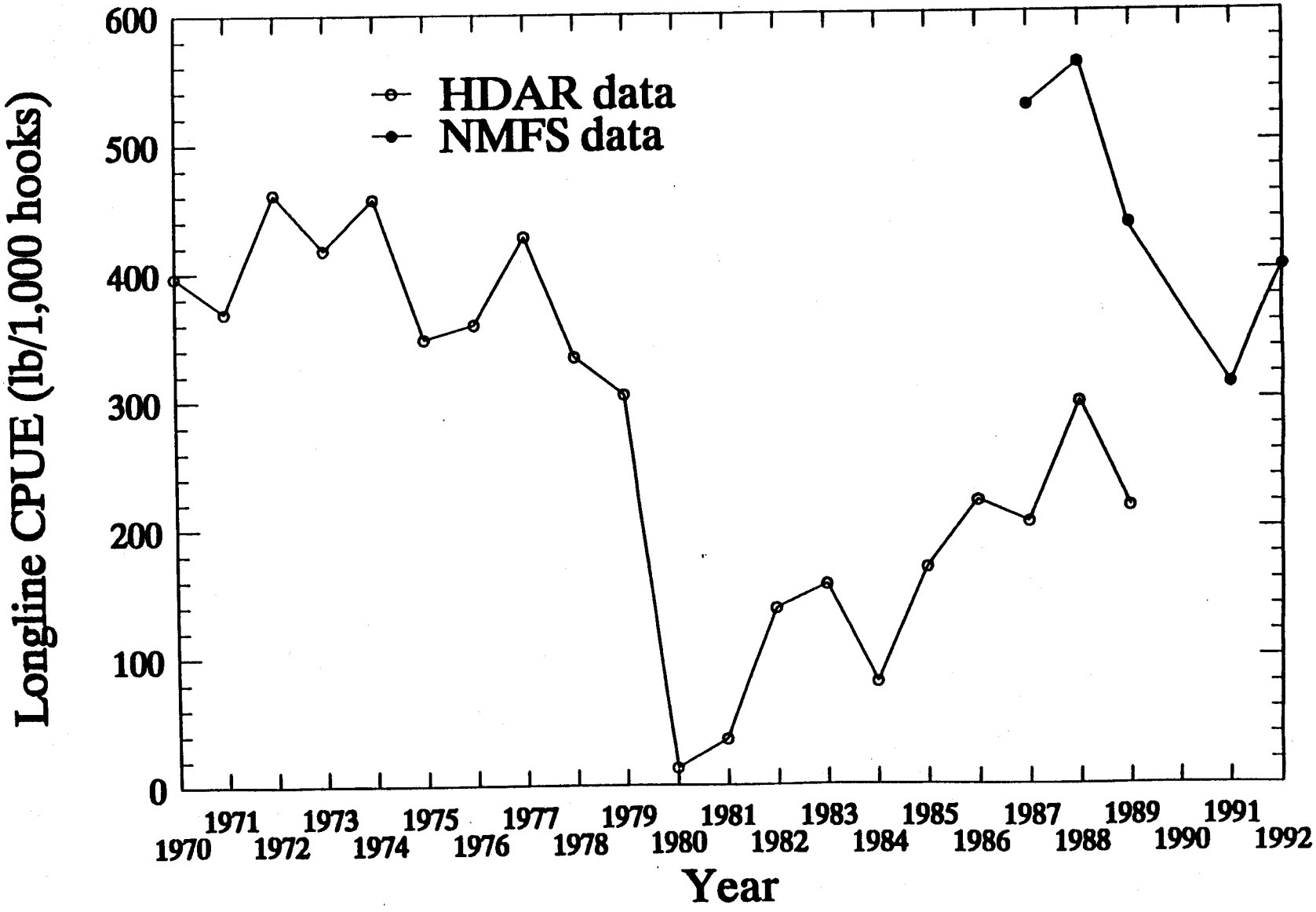
The increase in longline CPUE in the late-1980s, despite continued high levels of fishing pressure (total catch), may have reflected a reverse trend towards more shallow gear configuration. Many new entrants to the fishery in 1989-91 did not invest in the equipment required to set monofilament longline gear deep to target bigeye tuna. This equipment was not as important in the US east coast yellowfin and swordfish longline fisheries from which the new entrants had arrived. Many new entrants fished shallow even when targeting tuna (daytime fishing), which contributed to the increases in CPUE for all species associated with the upper layer of the ocean (i.e., yellowfin tuna, marlins, mahimahi, etc.)

Bigeye tuna

The total bigeye tuna catch (Fig. III-7, virtually the same as the longline bigeye tuna catch) and longline CPUE for bigeye tuna (Fig. III-9) appeared relatively stable in the 1970s, dropped precipitously in 1980 to almost zero, and increased again in the mid-1980s through 1991, and declined slightly in 1992 (Fig. III-7). Longline CPUE peaked in 1988, declined moderately in 1989-91, and increased slightly in 1992 (Fig.III-9).

The 1980-81 decline is hard to believe (Fig.III-9), and may reflect some error in the data. Bigeye tuna CPUE for the entire Pacific (Miyabe 1993) also reached a minimum in 1981, but the Pacific-wide drop was relatively small compared with the Hawaii drop. Generally, there was similarity between Pacific-wide CPUE data and Hawaii CPUE data through 1985, suggesting that local pelagic fish availability is linked to the abundance or catchability of a widespread population, although Pacific-wide CPUE declined to record low levels after 1985, whereas Hawaii CPUE remained relatively stable.

Figure III-9. Hawaii longline bigeye tuna CPUE, 1970-1992.



The increase in Hawaii CPUE in the 1980s (Fig. III-9) is probably a result of increased fishing depth to target bigeye tuna (Boggs 1992). The Pacific-wide data were corrected to account for changes in fishing depth (Miyabe 1993), and show less of an increase during the same period. It is possible that the decline in average 1989-92 CPUE, compared with 1987-88 NMFS data, is a result of continued increases in fishing pressure (total catch), but the evidence is weak considering the background variability in CPUE (Fig. III-9).

Blue marlin

The total blue marlin catch (by all gears) increased from 1975-78, remained relatively the same (0.4-0.6 million lb) through 1986, and then tripled to 1.5 million lb by 1989. The catch remains at this higher level (Fig. III-10).

Longline CPUE for blue marlin in the Hawaii longline fishery showed peaks and dips that correspond closely to those seen in Hawaii troll CPUE (Fig. III-11). The similarity of pattern suggests that both CPUE time-series reflected true changes in local abundance or catchability, despite the limitations of the available statistics (Boggs 1991, Boggs and Ito, in press). Both suggest declines in CPUE in the early- to mid-1980s (like yellowfin) when fishing pressure (total catch) was stable. The longline decline was greater than the troll decline, which would fit with the explanation of a trend towards setting deeper longline gear during this period because yellowfin tuna are caught at shallower depths. Similarly, the greater increase in longline CPUE from 1987-1989 would fit with the explanation of a new, shallow-fishing component of the longline fleet (see yellowfin tuna, above). There is no evidence of declining troll CPUE (Fig. III-11) associated with increased fishing pressure (total catch by all gears) from 1986-89 (Fig. III-10).

Blue marlin CPUE in the Hawaii fishery followed the same declining trend in the 1960s and 1970s as Pacific-wide blue marlin CPUE (Wetherall and Yong 1983, Skillman and Kamer 1992, Boggs and Ito, in press), suggesting that CPUE in Hawaii is related to the abundance or catchability of the stock over a wide-scale area.

Striped marlin

The striped marlin catch (by all gears) remained below 0.4 million lb/year until 1987, increased to about 1.3 million lb in 1988, and fluctuated between 1.0-1.5 million lb thereafter (Fig. III-10). CPUE showed a pattern of decline in the early- to mid-1980s, and an increase in the late 1980s (Fig. III-12). These trends were qualitatively similar to those seen for the other surface-oriented species, again suggesting changes in longline catch by all gears for surface-oriented species due to fishing at greater depths (Boggs 1992). CPUE declined from 1988-1991 although the decline did not correspond with an increase in fishing pressure (total catch by all gears). Again, over the long term, there has been a correspondence in trends between Hawaii CPUE and North Pacific longline CPUE (Skillman and Kamer 1992, Boggs and Ito 1993).

Figure III-10. Commercial landings of blue marlin, striped marlin, mahimahi and wahoo (ono), 1970-1992. Longline, troll and handline combined.

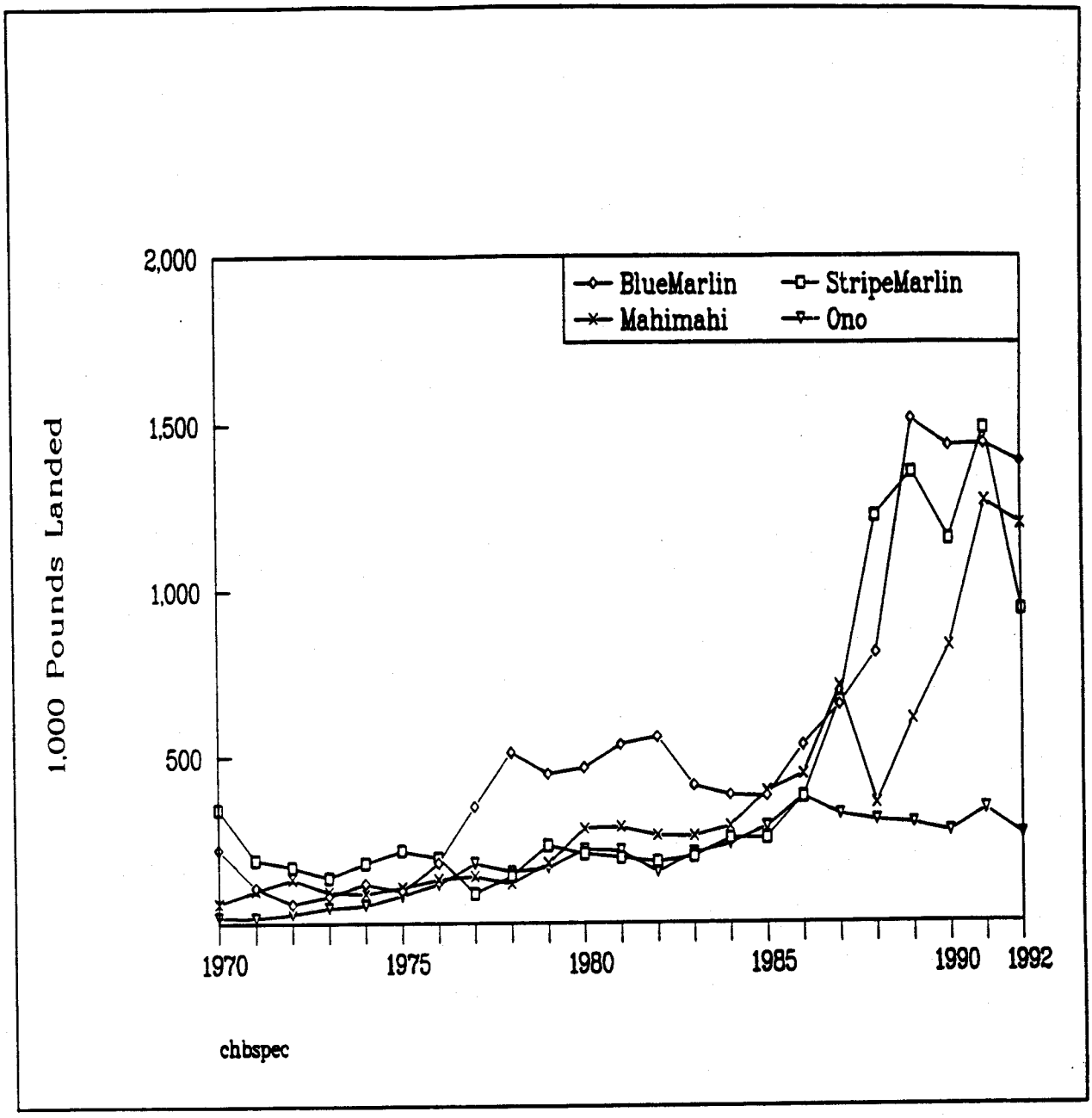


Figure III-11. Hawaii blue marlin CPUE, by gear type 1970-1992.

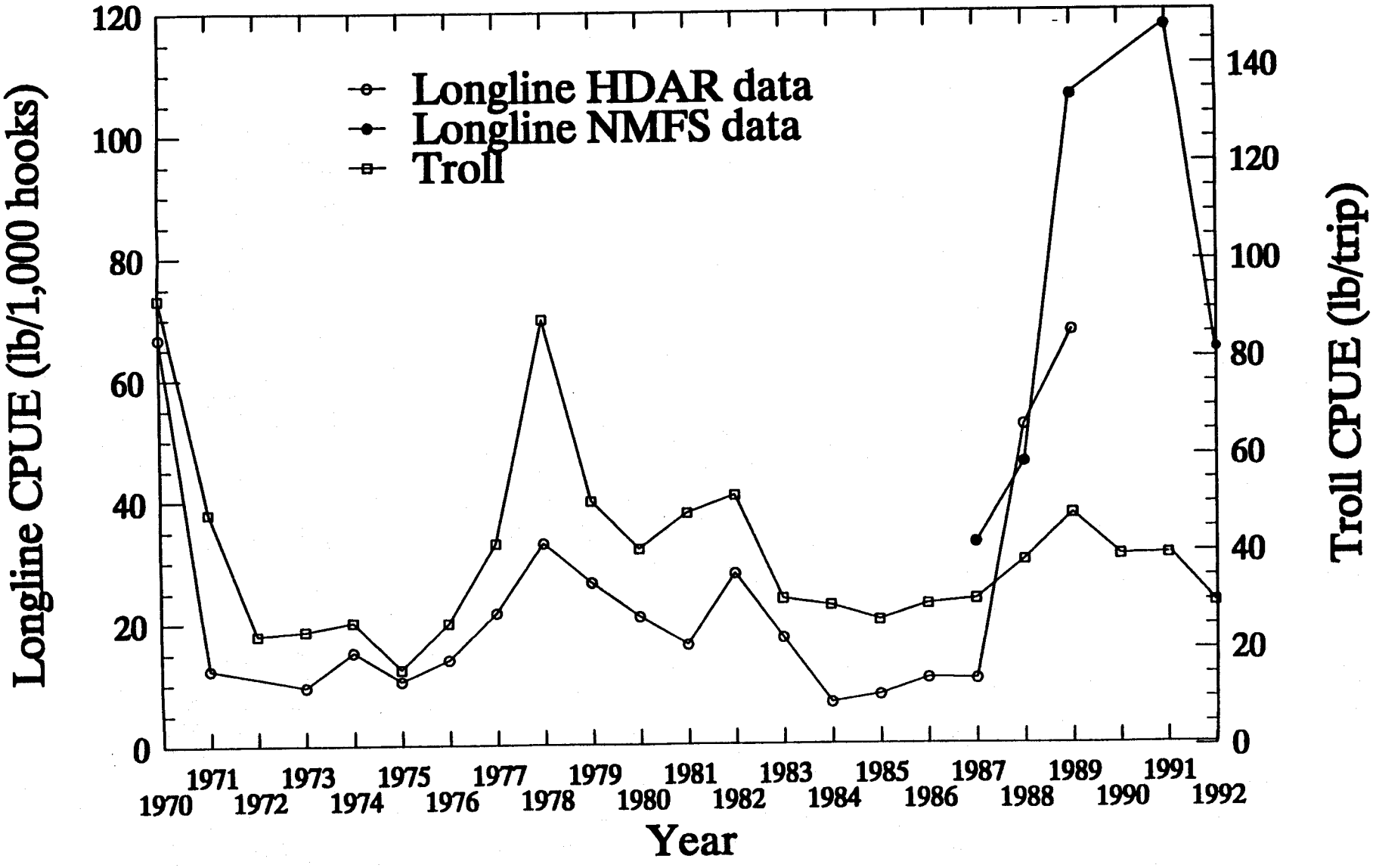
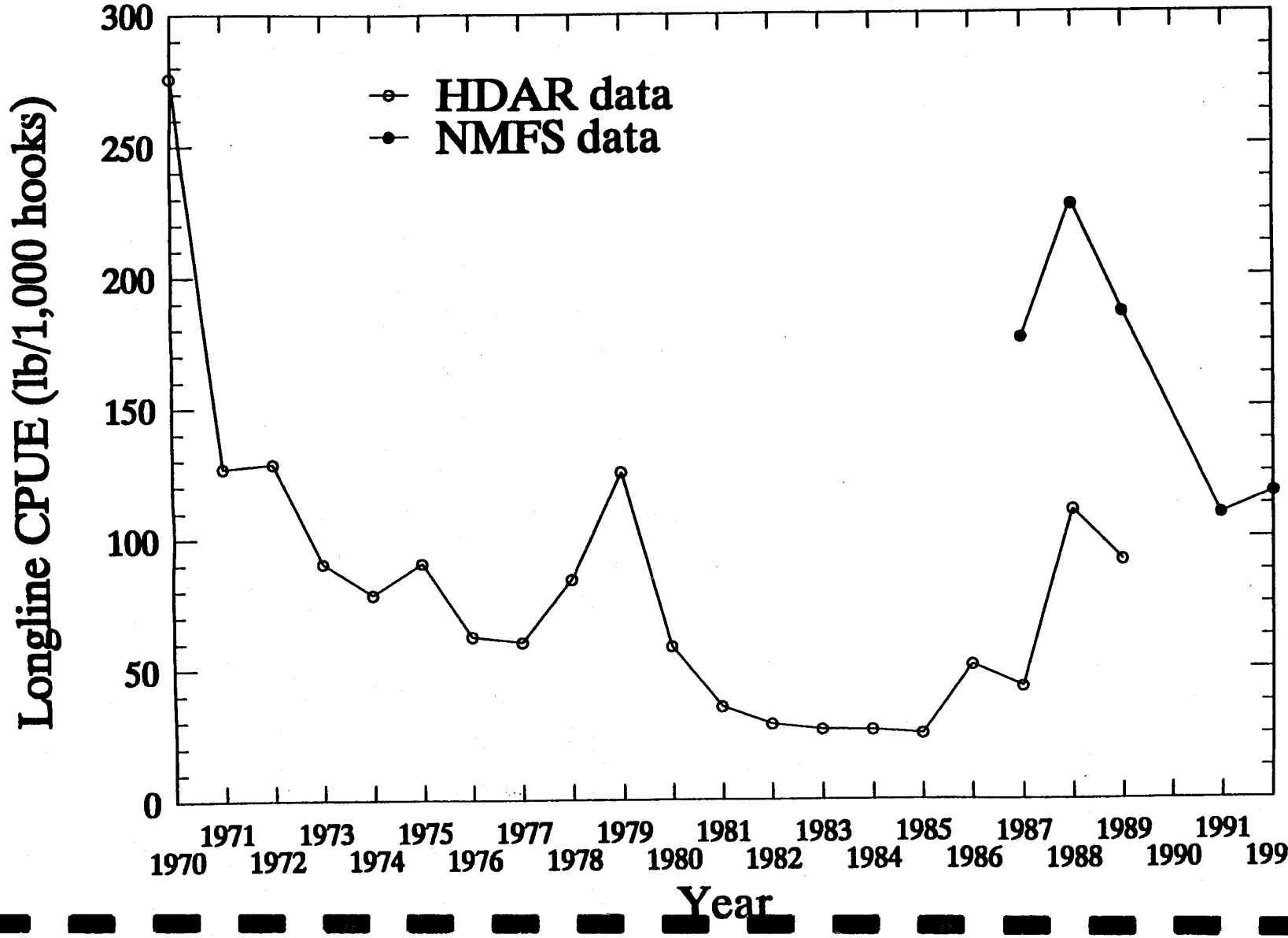


Figure III-12. Hawaii longline striped marlin CPUE, 1970-1992.



Mahimahi (Dolphin fish)

Mahimahi CPUE in the Hawaii longline fishery reached a peak in 1972, dropped in 1988, and then rose from 1989-92. This pattern was mirrored in the Hawaii troll and handline CPUE data (Fig. III-13). Troll and handline CPUE data corresponded with each other even more closely. The increase in CPUE by all three gear types since 1988, during the greatest increase in fishing pressure (total catch) on record (Fig. III-10) indicates no evidence of catch competition.

Summary

Patterns in CPUE of Hawaii's pelagic fisheries over the last two decades (1970-92) were variable, showing little net change associated with increases in local fishing pressure (estimated as total catch). This observation must be tempered by the acknowledgement that the available statistical basis for estimates of CPUE and total catch is weak[11]. For many species CPUE declined dramatically during the 1950s and 1960s following the pattern of declining CPUE seen in much larger foreign fisheries on the same stocks (Skillman and Kamer 1992; Boggs and Ito 1993). This correspondence suggests a close relationship between the availability of fish to Hawaii fishermen and the more widespread abundance of the stock. The pre-1970s decline in CPUE was typical for stocks moving from unexploited status to fully exploited status.

III.C.2. Processors.

Landings from the Hawaii-based pelagic fishery are primarily a fresh product (as discussed in Section III-D below). In addition to fresh fish retailers and wholesalers (as many as 100 dealers buy direct from the commercial fleet), approximately five businesses act as brokers for the export of longline-caught fish to the mainland US, Europe, and Japan. No estimates are available on the volume of their business.

Some pelagic landings are also processed locally into dried fish products and fish cake. Five to ten businesses are thought to be in this segment of the industry, but no estimates are available on their volume.

III.D Description of Markets and Products.

The Hawaii-based commercial pelagic fishery sells primarily to a fresh product market. Figure III-14 illustrates the major market channels for Hawaii's pelagic fish marketing. Although there was substantial research conducted on the Hawaii market in the early

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[11] See footnotes 9 and 13, Boggs (1991, in press) and Boggs and Ito (in press) for a discussion of the inadequacies of the data.

Figure III-13. Hawaii mahimahi CPUE, by gear type, 1970-1992.

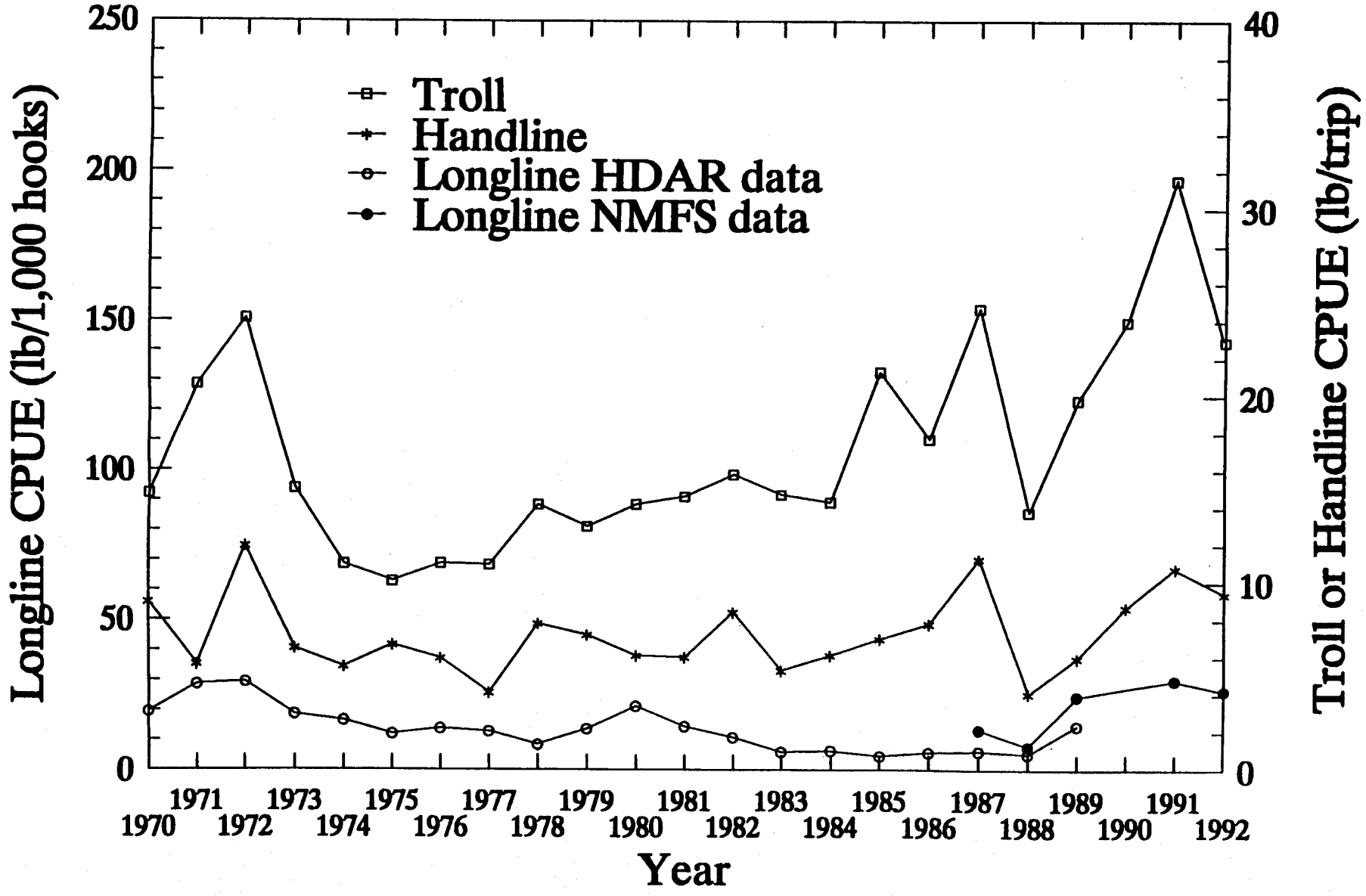
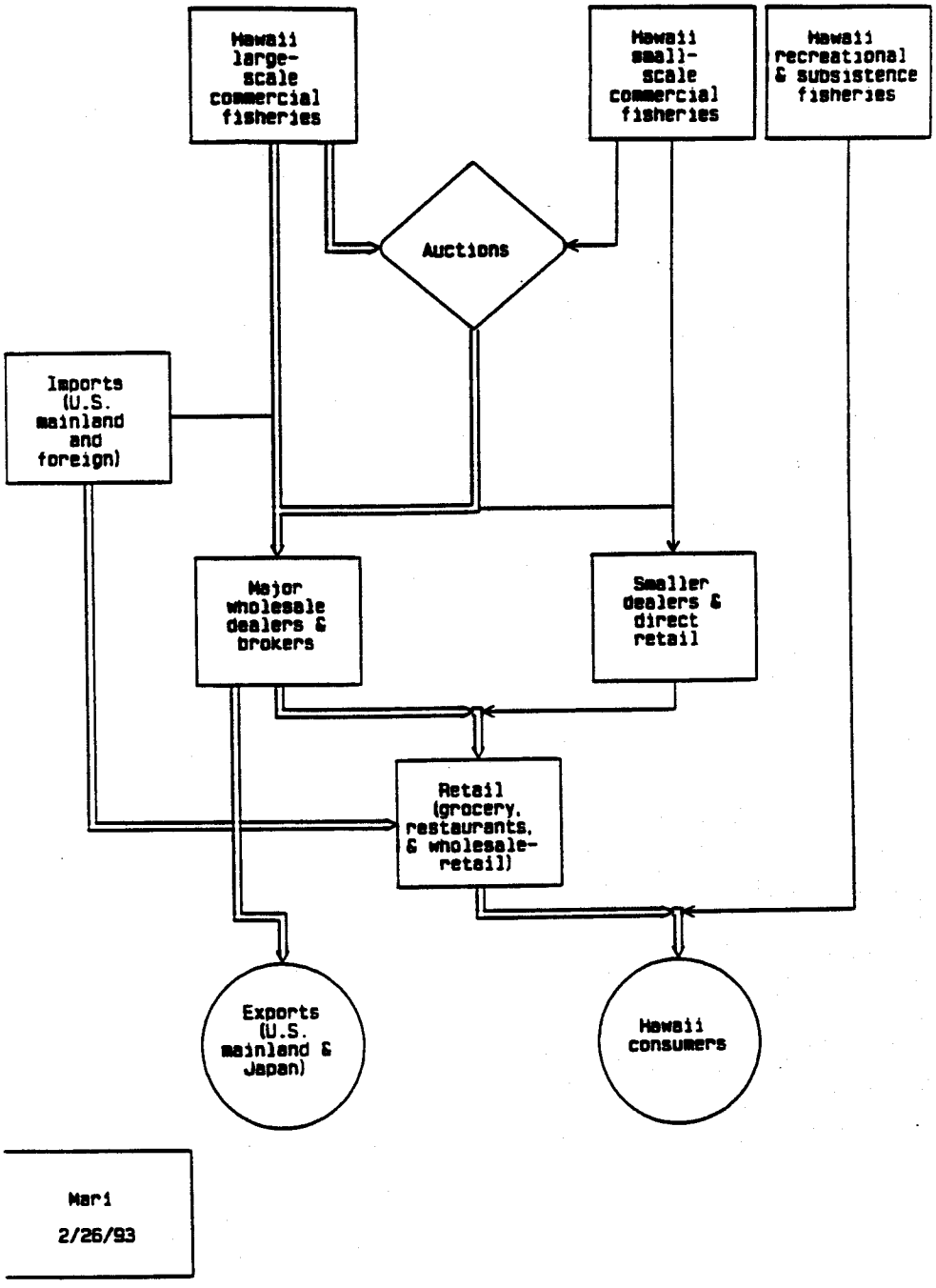


Figure III-14. Hawaii Seafood Market Channels.



to mid-1980s (Cooper and Pooley 1983, Higuchi and Pooley 1985a, and Pooley 1986), little market research has been conducted in the past five years. Therefore, it is impossible to produce accurate estimates of volume through particular market channels.

Ito (1992) provides the most recent detailed estimates of the overall volume of Hawaii's commercial pelagic fishery. The following information uses that provided by Ito (1992) as well as a summary of longline logbook information for 1991 (Dollar 1992), and unpublished preliminary estimates of 1992 market volume prepared by the Fishery Monitoring & Economics Program of the NMFS Honolulu Laboratory. Pooley (1993b) provides an overview of recent trends in Hawaii's commercial fisheries, including markets.

Table III-12 provides estimates of 1992 pelagic species landings and revenue in comparison to 1991 landings and revenue (not adjusted for inflation)[12], and Table III-13 and III-14 provide an overview of the Hawaii market in general for 1991 (all species). Tables III-8 and III-9 give longline and non-longline landings and revenue (by species) for 1991 and estimates for 1992, while Table III-15 gives total landings (all species) by gear type. Figures III-2 through III-4 provide estimates of recent trends in Hawaii pelagic landings by the major gear types. The following is a brief qualitative description of the pelagic commercial fishery market channels:

Longline landings can be divided into three main components:

- o swordfish
- o general tuna and other pelagics
- o high-quality bigeye tuna

Almost all swordfish are gilled and gutted prior to landing in Hawaii and transhipped by wholesalers and brokers to the east coast of the USA where it competes with Atlantic and Pacific swordfish from both domestic and foreign sources. Local landings of swordfish in 1992 were approximately 12.6 million lb ($24.2 million), up 28% in weight from 1991. In 1991 Hawaii landings (9.9 million lb) represented 56% of total reported US swordfish landings (18.0 million lb)[13] (Dept.of Commerce, 1992).

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[12] 1992 landings and revenue figures in this amendment were prepared by the NMFS Honolulu Laboratory, Fishery Monitoring & Economics Program. The figures are preliminary estimates based on year-to-date information. Longline logbook data are approximately 97% complete; Hawaii Division of Aquatic Resources (HDAR) troll and handline data are approximately 84% complete (i.e, 84% of the expected data for the year have been received. The extent to which these data accurately cover the full volume of catch is unknown.).

[13] Fisheries of the United States, 1991. Current Fishery Statistics No. 9100. US Department of Commerce, 1992.

Table III-12. Hawaii pelagic landings (1000 lb) and revenue ($1000), 1991 and 1992 (preliminary). NMFS logbook summary and HDAR commercial landings data.

Species	Landings (1,000 lb)		Revenue ($1,000)	
	1991	1992	1991	1992
Swordfish	9,914	12,643	$ 22,029	$ 24,279
Blue Marlin	1,469	1,305	1,024	1,311
Striped Marlin	1,490	1,145	1,481	1,448
Other Billfish	454	317	343	340
Mahimahi	1,281	1,199	2,087	1,969
Ono (wahoo)	483	380	1,061	965
Sharks	222	574	104	354
Bigeye tuna	3,678	3,463	12,799	12,190
Yellowfin tuna	3,713	2,989	8,103	6,223
Albacore	859	896	1,043	1,081
Other tuna	2,833	2,179	3,529	3,447
Other pelagics	508	380	711	613
TOTAL	26,904	26,390	$ 54,314	$ 54,220
(minus swordfish)	-9,914	-12,643	-22,029	-24,279
TOTAL (except swordfish	16,990	13,747	$ 32,285	$ 29,941

Table III-13. Hawaii seafood supply and market, 1991 Wholesale Purchase Level Preliminary NMFS estimates[1]

	All Species	
Source of Supply	Pounds 1,000s	Revenue $1,000s
Commercial Fishing[2]	29,400	$61,200
Recreational Fishing[3]	10,200	
= Hawaii Fishery	39,600	61,200
+ Foreign Imports[4]	17,000	38,100
+ US Mainland "imports"[5]	26,500	59,400
- Export (foreign and U.S. Mainland)[6]	11,200	23,300
= Hawaii Consumption (inc. recreational)[7]	71,900	
= Hawaii Market (commercial only)[8]	61,700	135,400

1 Honolulu Laboratory, National Marine Fisheries Service Fishery Monitoring & Economics Program

2 Hawaii Commercial fishing: domestic landings estimated by detailed NMFS logbooks and shoreside sampling, augmented by available State of Hawaii data for non-sampled fisheries

3 Recreational: volume estimated in 1981 by NMFS Marine Recreational Fishing Statistical Survey

4 Foreign imports: volume (pounds) recorded by US Food & Drug Administration monitoring; revenue estimated by Honolulu market price by NMFS (not adjusted for product form).

5 US mainland "imports": volume and revenue estimated as proportion of Foreign imports using raising factors calculated from 1981 NMFS seafood market survey in Hawaii.

6 Exports: estimated form domestic landings of lobster, bottomfish, swordfish, bigeye and yellowfin tuna.

7 Hawaii consumption: Hawaii fishery + Imports - Exports

8 Hawaii market: Hawaii consumption - Recreational

Table III-14. Hawaii commercial fisheries, 1991 NMFS estimates based on logbooks and shoreside monitoring

Fleet	Pounds Landed (1000s)	Revenue ($1000s)
Longline	19,500	$43,750
Troll-Hand Pelagics	5,030	7,785
Aku Boat (HDAR)	2,240	2,790
MHI[1] Bottomfish	715	2,320
NWHI[2] Bottomfish	390	1,040
NWHI Lobster	185	1,025
Other (Gas)[3]	1,310	$2,465
TOTAL	29,370	$61,175

[1] MHI = Main Hawaiian Islands

[2] NWHI = Northwestern Hawaiian Islands

[3] Information on other non-specified fisheries derived from NMFS compilation program (Gas), applied to HDAR data.

Table III-15. Commercial landings of pelagic species, revenues, and average prices. NMFS and HDAR data.

Year	Fishery	Pounds	Lb Sold	Revenue	Price
1991	Aku Boat	2,232,330	2,226,434	$2,815,872	$1.26
	Handline	1,862,890	1,811,287	3,139,119	1.73
	Trolling	3,203,074	2,728,239	4,656,671	1.71
	Longline	19,600,000	19,600,000	43,700,000	2.23
	Other	6,237	2,240	3,502	1.56
	TOTAL	26,904,531	26,368,200	$54,314,164	$2.06
	Excluding longline	7,304,531	6,768,200	10,614,164	1.57
	Troll & Handline	5,065,964	4,439,526	7,795,790	1.72
1992	Aku Boat	1,734,958	1,725,387	2,415,408	1.40
	Handline	1,939,085	1,897,077	3,229,033	1.70
	Trolling	2,472,975	2,092,934	3,920,218	1.87
	Longline	21,240,000	21,240,000	44,650,000	2.10
	Other	4,100	2,298	4,727	2.06
	TOTAL	27,391,129	26,957,696	$54,219,386	$2.01
	Excluding longline	6,151,129	5,717,696	9,569,386	1.67
	Troll & Handline	4,412,060	3,990,011	7,149.251	1.79

Most tuna (yellowfin, some bigeye, and skipjack) and other pelagics (mahimahi, wahoo [*ono*], moonfish [*opah*], and sharks) are landed whole in Hawaii and marketed by local (Hawaii) wholesalers. The local restaurant market is the primary destination for higher-priced tuna and other pelagics. The Honolulu seafood market is comprised of a wide range of firms, from those specializing in *sashimi*-quality tuna to those emphasizing fillets or steaks for grilling. A very small proportion of the swordfish landed enters the local market. The total volume of pelagic species, including the longline catch except for swordfish, was approximately 13.7 million pounds in 1992 ($27.7 million), down 20% in weight from 1991.

The gear composition of landings is important in determining marketability. Longline tuna is generally considered to be the highest value, while troll mahimahi is considered high value. In 1991, longline prices exceeded those obtained by troll and handline vessels (combined average) for bigeye and yellowfin tuna, the primary target species, while troll and handline operators got slightly better prices for mahimahi and wahoo.

The extent to which there is market competition between the two fisheries is debatable. On the one hand, the two fisheries land similar products so it seems that there are particular market segments which relate to species caught by each gear. Pooley (1990 and 1991a) undertook a brief examination of market interactions, but determined that the evidence concerning the relationship of longline to troll/handline sales was inconclusive due to limited information on exports.

Longline vessels are able to ice their catch more thoroughly, thus preserving product quality in a warm climate. Furthermore, longline vessels do not experience the phenomenon called *Burnt Tuna Syndrome (BTS)* which affects yellowfin tuna caught by troll and handline methods. *BTS* reduces the sightliness, texture and taste of the yellowfin tuna's flesh making it unsuitable for sashimi (raw fish), the highest priced use. Thus, longline-caught tuna tends to be exported (more often than troll or handline tuna) to Japan's sashimi market and sold to better white table cloth restaurants in Hawaii and on the US Mainland. On the other hand, troll and handline boats take shorter trips, making it possible for them to land a fresher product when BTS has not been a problem. This seems to pay off for their landings of mahimahi and wahoo, which are frequently destined for better restaurants. But, most of their tuna landings are believed sold for the lower-value grill market, due to the lower quality of the tuna relative to longline tuna. Table III-16 gives ex-vessel revenue by species and gear type for 1991 (Ito 1992).

Information on exports of tuna and other pelagics was unavailable until recently. The NMFS Honolulu Laboratory used a factor of 10% of longline bigeye landings and 10% of troll/handline yellowfin landings to provide a rough estimate of order-of-magnitude volume of Hawaii "exports" (not differentiating foreign exports from shipments to the mainland USA). However, these figures were based on information obtained in the early to mid-1980s, after which conditions in Hawaii's pelagic fisheries and pelagic

Table III-16. Hawaii's pelagic ex-vessel revenue (x $1,000) by gear type, 1987-91. Estimates are based on the wholesale marketing monitoring program of the National Marine Fisheries Service and Hawaii Division of Aquatic Resources.

Year	Swordfish	Blue Marlin	Striped marlin	Other billfish	mahi-mahi	Ono	Sharks	Bigeye tuna	Yellowfin tuna	Albacore	Skipjack tuna	Other pelagics
						Longline						
1987	200	100	800	200	100	200	100	6,500	1,500	500	<50	300
1988	200	200	1,200	300	100	200	100	9,200	3,300	900	<50	300
1989	1,100	600	1,400	300	400	400	100	10,600	5,100	700	<50	400
1990	9,700	700	1,500	200	600	200	100	10,900	5,800	600	<50	600
1991	22,000	500	1,400	300	700	200	100	12,500	4,300	900	100	700
						Troll and Handline						
1987	<50	800	100	100	2,100	600	<50	200	4,300	<50	200	<50
1988	100	600	200	100	1,300	600	<50	600	3,200	<50	200	<50
1989	100	800	200	100	1,900	500	<50	1,000	1,500	<50	300	<50
1990	<50	500	100	<50	2,300	500	<50	1,200	1,900	<50	200	<50
1991	<50	600	200	<50	2,800	700	<50	1,000	2,000	100	400	0
						Other Gear Types						
1987	<50	<50	<50	<50	<50	300	<50	<50	400	0	4,300	<50
1988	<50	<50	<50	<50	<50	300	<50	<50	600	<50	4,400	<50
1989	0	<50	<50	<50	<50	100	0	0	<50	0	4,300	<50
1990	0	<50	<50	<50	<50	<50	<50	<50	100	0	1,800	<50
1991	0	<50	<50	0	<50	<50	<50	<50	100	0	2,700	<50

Source: Ito (1992)

markets changed substantially. Recently US Customs data on exports were obtained by the NMFS Southwest Region which indicated that foreign exports of tuna from Hawaii were 1 million lb ($4.5 million) in 1991 (P. Donley, NMFS Southwest Region, Long Beach, pers. comm.).[14] Japan was the primary destination for these exports. Exports of other pelagic species were not noted in the export data but do occur. Table III-17 summarizes NMFS Southwest Region information on Hawaii pelagic exports. These figures are substantially higher than previously estimated by the Honolulu Laboratory, and may represent an important market breakthrough for the Hawaii pelagic fishery. While information on "exports" to the mainland US are not available, knowledgeable industry sources indicate that the volume is at least as large as for foreign exports, indicating that at least 33% and perhaps as much as 50% of longline tuna landings leave Hawaii. Handline tuna exports (foreign and US mainland) are believed to have declined to almost zero in the early 1990s, but an export market may still exist. Exports, at least to the US mainland, of other pelagics, primarily mahimahi, are also believed to be important.

Tuna and other pelagics are also imported into Hawaii, some directly through the Honolulu Customs District, and some indirectly through other US ports of entry. Table III-18 identifies the primary sources of supply and their volume, as recorded by the NMFS Market News Service from US Food & Drug Administration monitoring at the Honolulu Customs District. Total pelagic imports in 1991 were 5.6 million pounds, valued at approximately $10.5 million. Of this, frozen mahimahi is the largest component (3.6 million lb). Some of the imported tuna is re-exported to the mainland USA and to foreign countries.

High-quality bigeye tuna is frequently exported directly from Hawaii to Japan's fresh fish markets. This product is landed whole and is usually exported whole, on consignment. The Japanese market for Hawaii bigeye tuna is highly dependent on two central factors: the yen-dollar exchange rate and the supply of fresh bluefin and bigeye from alternative sources (e.g., Australia).

III.E Description of Support Industries.

Little is known in detail of the industries supporting Hawaii's commercial, recreational, and subsistence fisheries. The most recent detailed study examined the volume of business generated by foreign longline fishing boats and refrigerated transshipment boats which use Hawaii as a re-supply port (Hudgins and Iversen 1990). The support industries include suppliers to fishing vessels (fuel, bait, ice, provisions, equipment, etc.), shoreside infrastructure (harbors, transportation, shipyard and marine repair,

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[14] Although the exports are identified as yellowfin tuna, knowledgeable industry sources indicate that most, if not all, is actually bigeye tuna. Much of the bluefin tuna exports may also be bigeye since bluefin is a common name for bigeye tuna in Hawaii [only 100,000 lb of 'other tuna' was caught by longliners in 1991 (Table 5) versus 177,000 lb of "bluefin" exported. Export prices are also thought to be under-reported.

Table III-17. Hawaii fresh/frozen tuna exports in 1991. (NMFS Market News) no information available on other pelagic exports.

	Pounds Exported	Estimated (US $)	
		Price/lb	Value
Total Tunas	1,028,491	$4.33	$4,458,391
Bluefin	177,992	$5.47	$973,632
Unclassified	48,501	$3.22	$156,148
Yellowfin	801,998	$4.15	$3,328,611

Source: NMFS Market News

Table III-18. Hawaii fresh/frozen seafood imports, 1991.

	Pounds		
	Round	Fillet	Total
Pelagics	315,065	3,638,956	3,954,021
Billfish	9,557		9,557
Swordfish	425		425
Mahimahi	157,531	3,638,956	3,796,487
Wahoo	134,779		134,779
Other	12,773		12,773
Tunas	1,323,401	328,769	1,652,170
Albacore	129,124	2,132	131,256
Bigeye	361,653	2,500	364,153
Bluefin	646		646
Bonito	6,006		6,006
Skipjack	230,698	109,943	340,641
Yellowfin	595,274	214,194	809,468

Source: NMFS Southwest Region Market News

etc.), managerial services (insurance, administration, financing), market services (auctions, brokers, wholesalers, cold storage, processing, etc.), labor (fishing vessel captains and crews, market personnel, electronics and hydraulic technicians), and government services (fisheries research, monitoring and management, dockside security, etc.). For the recreational and charter fishing components of the pelagic fisheries, additional support is required, including fishing tackle and supplies, marketing to clients, arrangements with hotels, tournament administration, etc.

For this amendment, estimates of direct income to the support industries are based on a limited sample of cost-earnings information from commercial pelagic fishing vessels. Value-added components at the support industry level have not been calculated. Thus direct income roughly equates to ex-vessel or wholesale market value.

Table III-19 identifies the total industry direct income to industries which support Hawaii's commercial pelagic fishery (calculated as direct costs of each component of the commercial pelagic fleet). These figures were obtained by merging 1991 landings information (Ito 1992) with cost per pound information derived from cost-earnings samples (Pooley 1991b). Figure III-15 illustrates the breakdown of direct costs into capital, labor and other physical services. Figure III-16 indicates the direct income to support industries for the three components of Hawaii's commercial pelagic fishery. Figures III-17 and III-18 indicate the financial and operating cost components of direct support industry income created by Hawaii's commercial pelagic fishery.

The income generated by recreational fishing and by sports fishing tournaments is also poorly quantified, as is the total volume of participation in those segments of the fishery. In Hawaii, the differentiation between small-scale commercial and recreational fishing is difficult to determine. Skillman and Louie (1984) reported that 27% of small-boat owners sold at least a portion of their catch during the year, and Meyer (1987) found that 35% of small boat catches were sold on the market and 13% were sold "off" the market (i.e., not in established retail/wholesale outlets).

The only comprehensive survey of recreational fishing participation and catch was the Marine Recreational Fishing Statistical Survey (MRFSS) conducted under contract to NMFS in the western Pacific for 1979-81. The MRFSS estimated total recreational landings were 10 million pounds, of which over 50% were pelagic species.[15] There were 206,900 participants, of whom 77% were local residents and the remainder were visitors (i.e., tourists). There were 512,000 private recreational fishing trips taken, and 43,700 charter fishing boat trips taken in 1981. These were not broken down by type of fishing, but pelagic fishing (primarily trolling) probably represented a high percentage of these trips.

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[15] The survey results were not published by NMFS headquarters at the time. A brief summary of the survey and of other research on recreational fishing in Hawaii is contained in Pooley (1993a). Although the survey was designed to count only fish caught for recreational purposes (i.e., not to be sold), it is not clear that the results represent only un-sold fish.

Table III-19A. Hawaii commercial pelagic fishery: Estimated total and net revenue, costs and income in 1992 (Longline, troll-handlined and charterboat segments combined)

Pelagic Fishery Total ($1000s)		
Revenue		$71,016
Costs	Financial Sector Costs[1]	$24,213
	Fuel & Oil	8,024
	Repair Services	3,777
	Supplies	10,725
	Equipment	5,308
	Handling Service	10,653
	Other	3,835
	Labor & Mgmt	11,898
	Total Cost	$78,432
Net Revenue		$7,416

[1] Excluding annual repairs

Table III-19B. Hawaii commercial fishing support. Estimated direct income in 1992.

	Industry Cost Components ($1,000s)
Longline	
Total	$61,498
Capital	18,447
Operating	33,405
Labor & Mgmt	9,646
Troll-handline	
Total	8,123
Capital	2,309
Operating	5,073
Labor & Mgmt	714
Charterboat	
Total	9,566
Capital	3,457
Operating	4,599
Labor & Mgmt	1,511
Total	
Total	79,188
Capital	24,213
Operating	43,077
Labor & Mgmt	11,898

Figure III-15. **Breakdown of direct costs into capital, labor and other physical services. Expressed in 1992 dollars.**

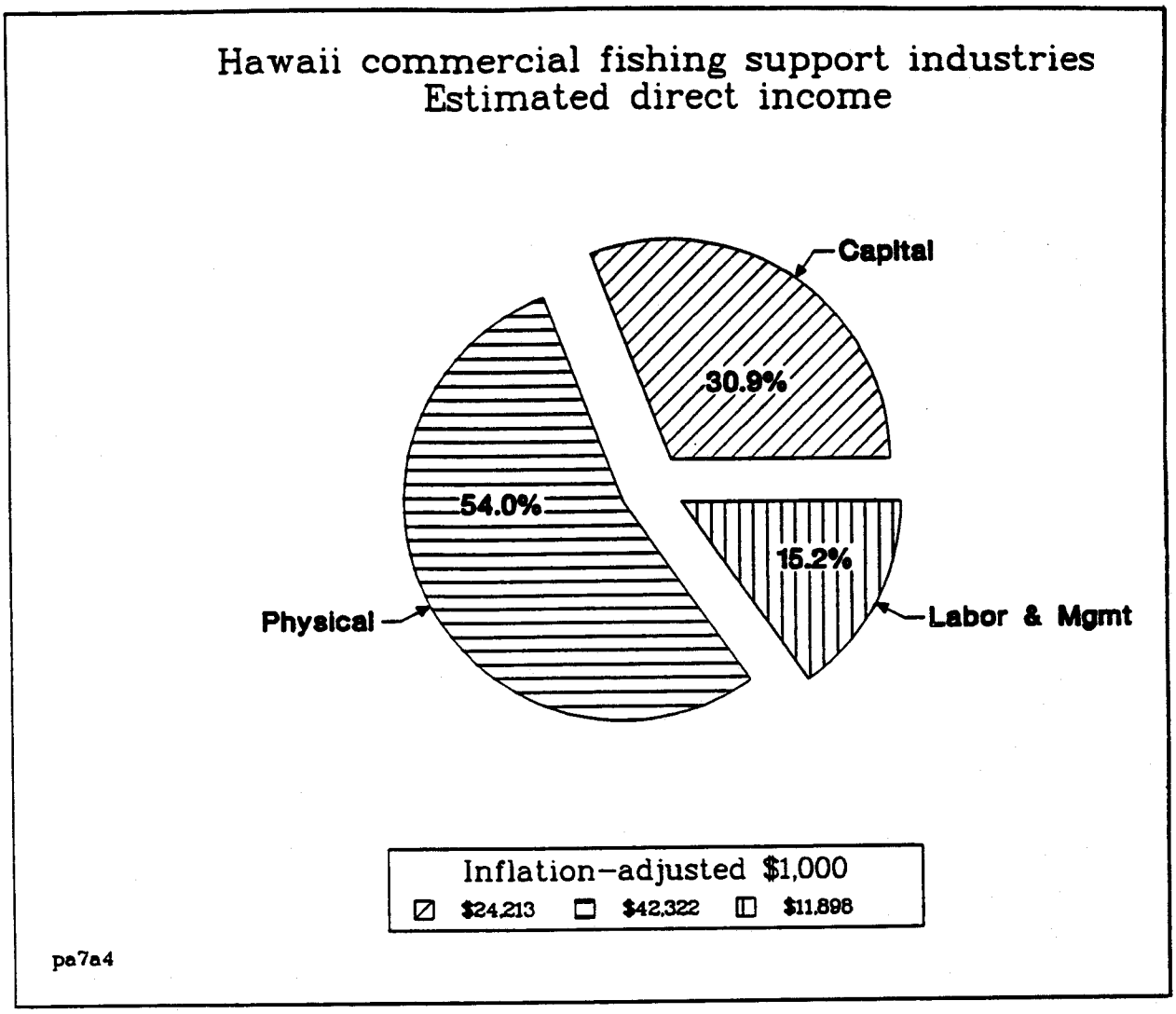


Figure III-16. Direct income to support industries derived from longline, troll-handline and charterboat commercial fisheries. (1992 dollars).

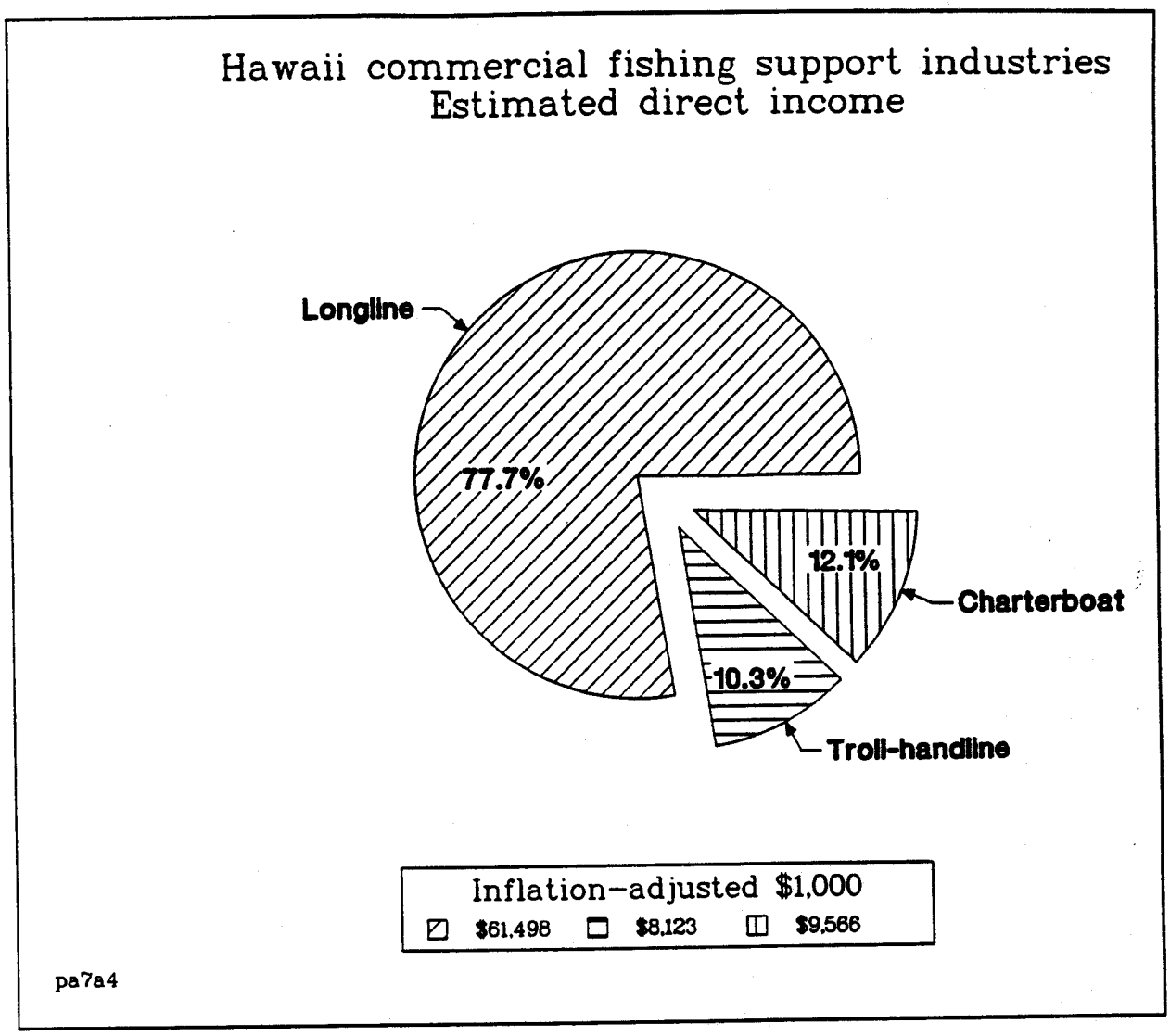


Figure III-17. Financial services components of direct support industry income created by Hawaii's commercial pelagic fishery.

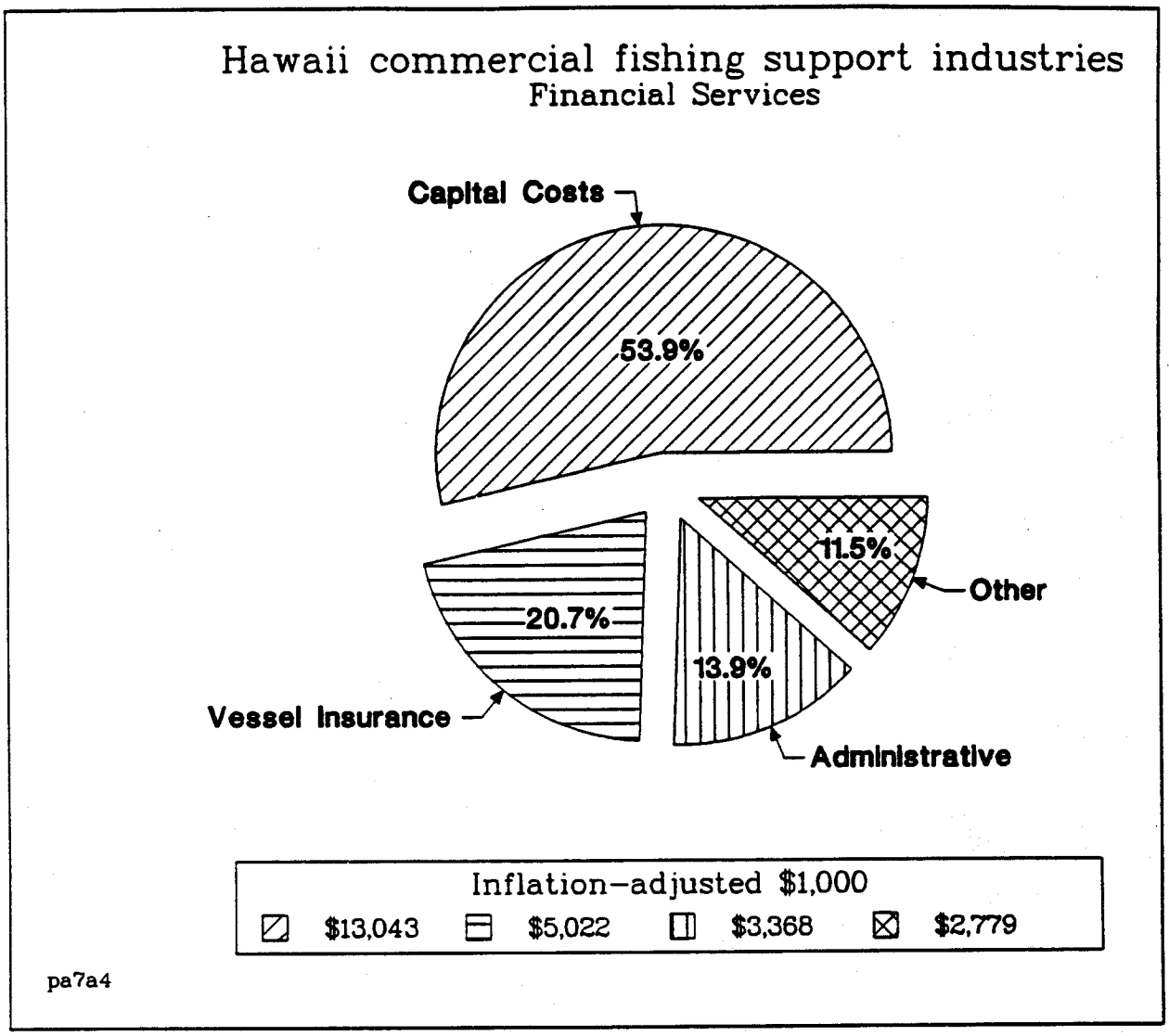
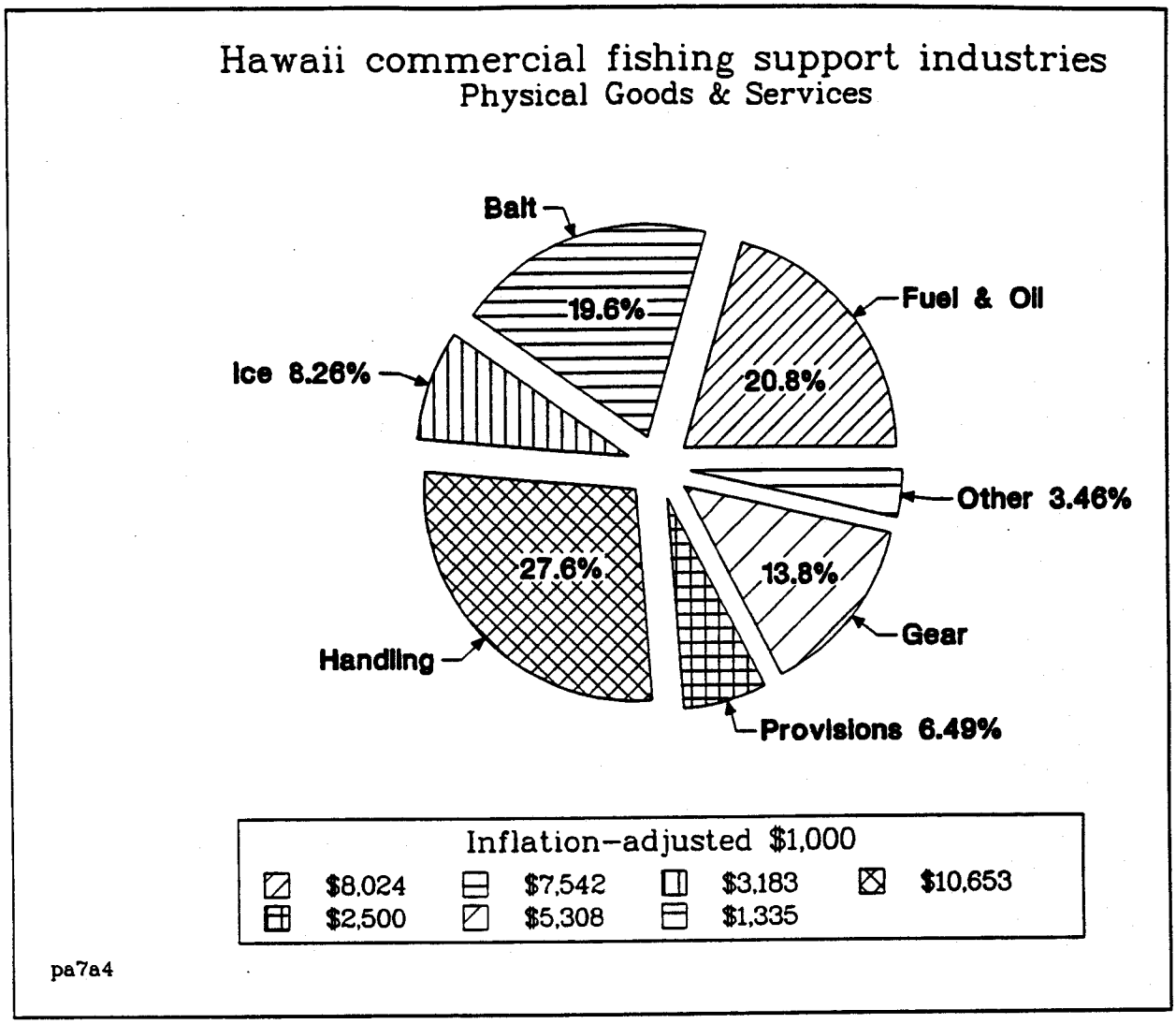


Figure III-18. Physical goods and services components of direct support industry income created by Hawaii's commercial pelagic fishery.



In terms of direct income from recreational fishing, information is also limited. The MRFSS found 1981 recreational fishing expenditures (all species) for private fishing vessels at $9.6 million and $3.2 million for charter boat fishing. Samples, et. al. (1984) estimated charter fishing revenue to be $8.1 million in 1982.

Meyer (1987) estimated direct expenditures of $24 million from small boat fishing for 1985. The 1991 USFWS National Survey of Fishing, Hunting and Wildlife-Associated Recreation estimated that $71.8 million fishing trip-related expenditures occurred in Hawaii in 1991 (USWFS, 1993).[16] Recently a State of Hawaii economic development research report estimated charter fishing expenditures at $11.5 million, and billfish tournaments at $3.9 million (MacDonald and Markrich 1992).

Finally, the hedonic (*non-market*) value of recreational fishing and the income-substitution effects from the subsistence element of the tuna and pelagic fisheries are also poorly quantified. Meyer (1987) estimated hedonic benefits of $240 million for the Hawaii small boat fishery. However, allocation of these figures to pelagic fishing, per se, was not attempted and the methodology was experimental. However, it is clear that, although not adequately quantified, recreational fishing represents an important economic sector in Hawaii's pelagic fishery.

III.F Relative Importance of Pelagic Fisheries to State of Hawaii

The relative contribution of commercial fisheries to Hawaii's economy is small. The US Bureau of Economic Analysis indicates that the total contribution of "Agricultural service, forestry and fisheries" to the state's Gross State Product in 1989 was $111 million, or about 0.4% of the state's Gross State Product (Hawaii DBEDT 1991). The pelagic fisheries accounted for about $71 million in total revenue in 1992, and probably accounted directly for less than one thousand jobs (full-time equivalents). Thus, even a large change in the condition of the pelagic fisheries will not constitute a large change in Hawaii's overall labor picture or economy.

The size and economic values of the commercial troll and handline fisheries have not been well defined. Most vessels used in commercial fishing in Hawaii are undocumented, and state-registered vessels. According to state records, there were more than 14,000 state registered vessels in Hawaii as of 30 December 1990. Of these, 1,038 were listed as being engaged in "commercial fishing" (State Department of Transportation). Relatively few of the vessels listed as used in commercial fishing are used full-time in the fisheries, and it is assumed that those used full-time are mostly engaged in pelagic fisheries. The permit programs for the crustacean and bottomfish fisheries of the Northwestern Hawaiian Islands show only about 50 vessels (the majority of which are documented) operate in those fisheries, and even these

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[16] These expenditure estimates include fishing of all types (e.g., fresh-water and saltwater) and all modes of fishing (e.g., shoreside, charter-boat, small boat). No separate estimates of expenditures related to pelagic recreational fishing are available.

vessels may operate part-time in pelagic fisheries. The total number of trips taken by troll and handline vessels in 1992 was estimated at about 30,000 trips. Thus, the "average" vessel would have taken about 30 trips. More likely, a small number of vessels were used nearly full time (e.g., about 160 trips per year), while the larger majority were used on weekends and holidays to supplement income from other occupations.

The fisheries often have greater importance to isolated communities (e.g., Waianae and Haleiwa on the island of Oahu, which have relatively large numbers of troll fishermen; Hilo, Hawaii, which has large numbers of handline fishermen; Miloili, Hawaii, with a native Hawaiian fishery interest; and Kailua-Kona, Hawaii, and Kewalo Basin, Oahu, which are significant charter fishing centers). Unfortunately, there are no studies providing useful data on overall employment, labor market characteristics, and demographics for people in these communities relative to fisheries. Thus, the impacts of changes in landings, and ultimately in vessel activity patterns, cannot be described in terms of employment rates, incomes, labor education and mobility, community structure and stability, or the ability of potentially displaced fishermen to find other jobs. Determining if any current troll or handline fishermen would shift to the longline fishery if entry were open to new people is also difficult given the available data.

The number of people who rely on pelagic fisheries as a significant or dominant source of food in a subsistence fishery has not been estimated. Determining the impact of current regulations on native Hawaiian fishermen is also problematic. For example, it is not known how many native Hawaiian fishermen would have entered the pelagic longline fishery in the absence of the current limited entry program. Similarly, it is not known if native fishermen have been adversely affected by increased catches by longline vessels or other non-native Hawaiian fishermen in or near communities in which these native Hawaiian fishermen live.

III.G Protected Marine Resources & Longline Fishery Interactions

Twelve federally protected marine animals are known to have had interactions with Hawaii-based longline vessels within or beyond the 200-mile EEZ surrounding the Hawaiian archipelago (Table III-20).

III.G.1 Status of Protected Species

Hawaiian Monk Seal

The primary habitat of the Hawaiian monk seal is the Northwestern Hawaiian Islands (NWHI), specifically Kure Atoll, Midway Islands, Pearl and Hermes Reef, Lisianski Island, Laysan Island, French Frigate Shoals, Necker Island, and Nihoa Island. The major pupping islands are in the NWHI, but monk seals are seen occasionally on beaches in the main Hawaiian Islands.

Table III-20. Protected Species Reported Interacting with the Hawaii-based Longline Fishery.

Marine Mammals:

- Hawaiian monk seal (*Monachus schauinslandi*) - endangered
- Humpback whale (*Megaptera novaeangliae*) - endangered
- False killer whale (*Pseudorca crassidens*) - protected
- Dolphin spp. - protected

Sea Turtles:

- Green turtle (*Chelonia mydas*) - threatened
- Leatherback turtle (*Dermochleys coriacea*) - endangered
- Olive ridley turtle (*Lepidochlys olivacea*) - endangered
- Loggerhead turtle (*Caretta caretta*) - threatened
- Hawksbill turtle (*Eretmochelys imbricata*) - endangered

Sea birds:

- Laysan albatross (*Diomedea immutabilis*) - protected
- Black-footed albatross (*Diomedea nigripes*) - protected
- Booby (*Sula* sp.) - protected

"Endangered species" means any species which is in danger of extinction throughout all or a significant portion of its range other than a species of the Class Insecta. (Class Insecta was determined by the Secretary to constitute a pest whose protection under the Endangered Species Act would present an overwhelmingly and overriding risk to man.)

"Threatened species" means any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

"Protected species" means, for the purpose of this amendment, any marine mammal, migratory seabird or listed species protected under the Marine Mammal Protection Act (MMPA), the Endangered Species Act (ESA) or Migratory Bird Treaty Act. Marine mammals listed as threatened or endangered are covered under both the MMPA and ESA.

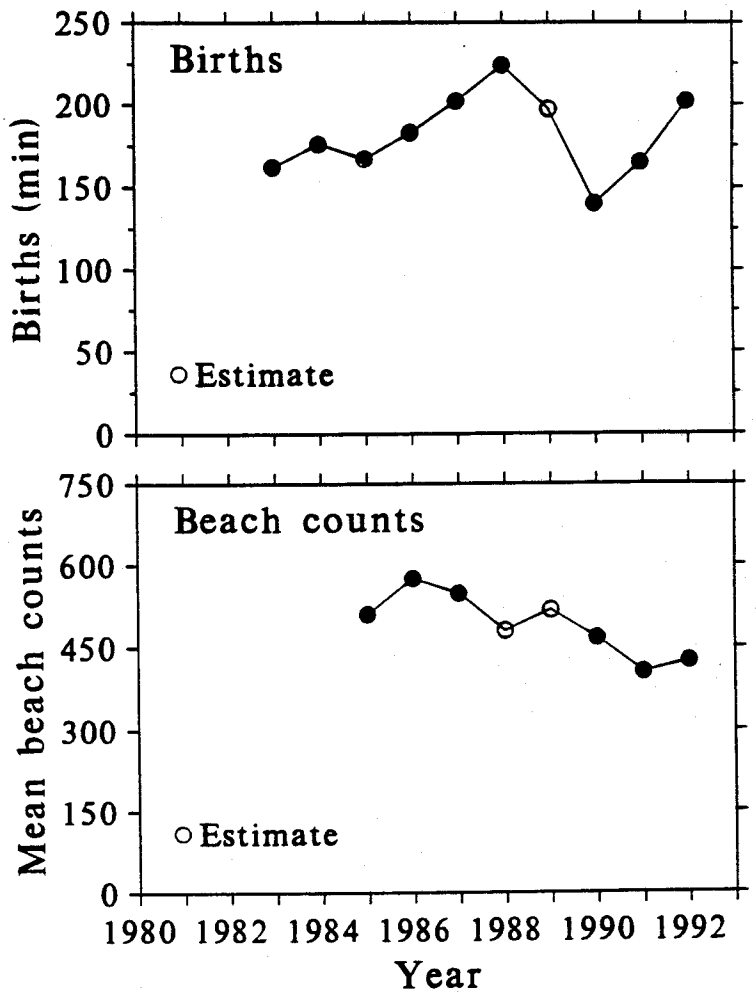
The Hawaiian monk seal is the most endangered seal in the United States. In 1986, the NMFS designated the seal's breeding habitat and surrounding waters out to 10 fm as "critical habitat" (which was expanded to 20 fm in 1988).

In 1992, the Hawaiian monk seal population was estimated at 1,580 animals (Ragen 1993) which was 10% lower than the average estimated size of the population between 1983 and 1988 (Table III-21).[17] The 1992 mean total beach count of 431 seals, excluding pups, at the five major breeding islands was 14% lower than the average annual beach counts for 1985-1991 (Ragen 1993) (Figure III-19).

Between 1983-1991, the minimum number of seal births averaged 180 annually. In 1990 there were only 143 births, perhaps the lowest number in any year during the last decade (NOAA 1991a). In 1992 the number of births increased to 209 (Ragen 1993).

Figure III-19. Mean Beach Counts & Minimum Number of Annual Births of Monk Seals

(Ragen 1993)



[17] No population estimates are available for 1989 - 1991)

Table III-21. Hawaiian Monk Seal Estimated Population Size and Counts

Year	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Est. Total Abundance[a]	1627	1501	1710	1976	1912	1752	----	----	----	1580
Mean Beach Count[b]	----	----	509	575	547	480[c]	517[c]	466	405	431
No. of Births	162	176	167	183	202	224	197[c]	143	165	209

Data source: Ragen 1993; Gilmartin, et.al. (submitted to Mar. Mamm. Sci.)

[a] based on beach counts at French Frigate Shoals, Laysan, Lisianski, Pearl & Hermes, Kure, Midway, Necker, and Nihoa.

[b] based on beach counts, excluding pups, at the five major breeding locations: French Frigate Shoals, Laysan, Lisianski, Pearl & Hermes, and Kure.

[c] Estimate

Humpback Whale

The Hawaiian Islands serve as breeding, calving, nursing, and wintering grounds for perhaps as much as one-half the estimated population (1200 to 2000 animals) of central North Pacific humpback whales (Johnson and Wellman 1984, Darling and Morowitz 1986, Baker and Herman 1987). As early as November, the whales begin arriving in Hawaii from the higher latitude North Pacific summer feeding grounds off Alaska and Canada. Their numbers peak in Hawaii between December to March. In April, they begin migrating out of Hawaiian waters and by late May or early June the last whales usually have departed (Naughton & Nitta 1989). A few animals have been sighted in the NWHI (Naughton & Nitta 1989).

During the winter breeding season, humpback whales concentrate in shallow waters, usually less than 100 fm, and are attracted to broad bank areas in the main Hawaiian Islands. Here the whales engage in mating activities and the females bear their young.

The major areas of concentration of whales are the Penguin Bank, the "four island area" between Molokai, Maui, Kahoolawe and Lanai, and the nearshore waters of Hawaii Island between Upolu Point and Keahole Point. On 4 November 1992, most of these areas were designated a Hawaiian Islands Humpback Whale National Marine Sanctuary encompassing all waters within the 100-fm isobath around the islands of Lanai, Maui, and Molokai, including Penguin Bank (the area within 3 nautical miles of Kahoolawe is excluded); the deeper waters between Molokai and Maui (Pailolo Channel from Cape Halawa, Molokai to Nakelele Point, Maui) and waters within 100 fm off Kauai's Kilauea Point National Wildlife Refuge. Few animals have been reported from around the atolls, islands, and banks of the NWHI, although they are seen in the NWHI.

The low population of humpback whales is attributed to commercial whaling in the past. There is no published information that demonstrates whether the present population of humpback whales is stable, increasing, or decreasing in numbers.

False Killer Whale

The false killer whale is found near all the main islands. An aerial survey of the leeward sides (south shore) of Oahu, Lanai, and Hawaii documented a minimum of 470 individuals (Leatherwood and Reeves 1989). However, its occurrence and distribution in the NWHI is unknown.

Dolphin spp.

The two species of dolphins that are found throughout the Hawaiian Archipelago are the bottlenose dolphin and rough-toothed dolphin. Aerial and vessel surveys of inshore waters around the main Hawaiian Islands indicated a minimum of 430

bottlenose dolphins (unpublished data, US Navy). There is no estimate on the abundance of rough-tooth dolphin in Hawaiian waters, although 23 were collected for display purposes between 1963-1981 (Shallenberger 1981).

Green Turtle

Green turtles are found throughout the Hawaiian Archipelago. Their distribution, however, has been reduced with breeding aggregations being eliminated and certain foraging areas no longer utilized in the main Hawaiian Islands (Balazs 1980, Balazs, et al. 1987) Presently, more than 90% of the breeding and nesting activity of Hawaiian green turtles occurs at French Frigate Shoals, in the NWHI (Nitta and Henderson, in prep). The number of females nesting there fluctuates annually, the mean being estimated as high as 300 from 1973-1982 (Balazs 1980, Wetherall 1983). The total mature female population using French Frigate Shoals is presently estimated at approximately 1000 animals (G. Balazs, NMFS Honolulu Laboratory, pers. com.).

Leatherback Turtle

Leatherback turtles, the largest and most pelagic of the marine turtles, are commonly seen by fishermen in Hawaiian offshore waters, generally beyond the 100-fm isobath, but within sight of land. Two areas where sightings often occur are off the north coast of Oahu and west coast of the Island of Hawaii (Balazs et al. 1992). There is indication that the offshore waters surrounding the Hawaiian Islands constitutes regularly used foraging habitat and migratory pathways for the leatherbacks (Balazs et al. 1992). Further to the north of the Hawaiian Islands, a high seas aggregation of these turtles is known to occur at latitude 35°-45°N, longitude 175°-180°W (Skillman and Balazs, in press). The nesting habitat and origin of these leatherback turtles is not known.

Olive Ridley Turtle

Available information suggests that the Olive Ridley regularly uses the Hawaiian pelagic region for foraging and/or developmental migrations by post-hatching juveniles during their "lost year(s)". Juvenile and subadult Olive Ridleys are among the life stages known to be present in Hawaiian waters. Olive Ridleys found in Hawaiian waters are considered endangered because they are assumed to originate from the eastern Pacific breeding aggregations of Mexico; the population in Mexico is listed as endangered (Balazs, et al. 1992).

Loggerhead Turtle

The loggerhead is a cosmopolitan species found in temperate and subtropical waters. Nearly all nesting occurs north of 25° N or south of 25° S (Nitta and Henderson, in prep). Adult loggerheads undertake long reproductive migrations between their

historical nesting sites and foraging areas, but their dispersal patterns in foraging areas are not well known for any population (Wetherall, et al., in press).

In the North Pacific the only major nesting beaches are in the southern part of Japan (Dodd 1978). Although reliable counts are not available, as many as 2,000-3,000 loggerheads may nest annually on beaches throughout Japan. Immature loggerheads encountered during driftnet fishing in the North Pacific may have originated from nesting beaches in Japan, being transported to the north and east by the Kuroshio Current and its extension (Wetherall, et al. in press). Loggerheads reportedly taken in the Hawaiian longline fishery for swordfish may be of the same origin.

Hawksbill Turtle

The hawksbill occurs circum-globally and is the most tropical of all marine turtles. The hawksbill is commonly considered one of the most endangered species of marine turtles due to the long history of international commercial trade in tortoise shell.

Hawksbills encountered in the North Pacific high seas drift gillnet fisheries may originate from the scattered, low level, nesting sites to the southwest in the Hawaiian Islands (Balazs et al. 1990). An alternate, or additional, origin may be the beaches in southern Japan, including the Ryukyu Islands (Uchida and Nishiwaki, 1982, Kamezaki 1987, Teruya and Uchida 1988).

Laysan Albatross, Black-footed Albatross, and Booby species

Although the distribution of the Laysan albatross ranges widely over the North and central Pacific oceans, it nests primarily in the NWHI. Nesting activity and several chicks have been observed on Kauai and Oahu in the main Hawaiian islands. The current population of Laysan albatross is estimated at 2.5 million.

The Black-footed albatross also breeds in the NWHI. It is estimated that the population of black-footed albatross is 200,000. There are 6,590-7,950 breeding pairs for the three species of booby (Harrison 1990).

The Laysan and Black-footed albatross, and Masked, Brown and Red-footed booby are protected under the Migratory Bird Treaty Act. The US Fish and Wildlife Service enforces prohibitions on the purposeful taking of these birds within US waters.

III.G.2 Interaction between Hawaii-Based Longline Fishing Vessels and Endangered and Protected Species

In Hawaii, fisheries (including the longline fishery) are currently classified by NMFS as Category III under the Marine Mammal Protection Act (MMPA). This means that, although interactions with marine mammals may occur, these animals would not

normally be hooked, snagged, injured or killed during fishing operations, and no special MMPA permits are required to conduct fishing operations.

In general, an interaction between a longline vessel and protected species means an animal is accidentally hooked or entangled, or the catch or bait is removed by the protected animal. All interactions are required to be recorded by vessel operators on federal daily logsheets that are submitted to the NMFS. Since no protected species can be retained, interactions are reported as number of animals released alive, injured, or dead (RAID).

As in most logbook programs, not all fishermen accurately report interactions but this misreporting is unquantified. Of 1,665 longline trips taken in 1991, only 7% (118 trips) reported interactions with protected species. On the other hand, six of the ten longline trips (60%) that were accompanied by NMFS observers that year had interactions (WPRFMC 1991).

Non-reporting or underreporting of interactions by fishermen is primarily attributed to the fear of punishment by the federal government, using the logbook information for documenting violations related to protected resources. This fear still persists even after the NMFS has clarified to what extent interaction data from fishing logbooks provided by fishermen, voluntarily or involuntarily, will be used in prosecution for takes of protected species (56 FR 13613, 3 April 1991). According to NMFS, "the totality of the circumstances, including the nature of the interaction and the context in which the take occurred, will be considered. The determination of the legality of a take and appropriate sanctions will be made on a case-by-case basis".

In 1991, longline vessel operators reported that 184 protected animals were taken and released alive, injured, or dead (NMFS, Honolulu Laboratory, unpublished data). In 1992, this number decreased to 180, as reported in the logbooks (Table III-22). Over 80% of the 1992 interactions occurred outside the EEZ of Hawaii, while 16% took place inside the zone (Table III-23).

Hawaiian Monk Seal

Foreign longline vessels reportedly fished in the NWHI during the 1950s, and the first accounts of domestic vessels from Hawaii longline fishing in the NWHI were reported in the early 1980s. These vessels primarily targeted bigeye and yellowfin tuna, and fished away from the activity centers of monk seals. With the development and expansion of Hawaii's longline swordfish fishery in 1990s, however, longliners began fishing closer to the NWHI, especially around "66 Fathom Bank" near French Frigate Shoals, St. Rogatien and Brooks Banks, and Gardner Pinnacles. As many as 20 vessels reportedly conducted longline fishing for swordfish in the NWHI during part of the season.

Longline operations for swordfish attract seals because the longline is baited with squid, the gear is fished close to the surface with luminescent "light sticks", and the lines are close to the banks and drop-offs where the seals often feed at night. In 1990 and early 1991, incidental hookings and snagging of seals by longliners targeting swordfish were confirmed. Seven injured seals were observed during a survey at French Frigate Shoals in 1990. In 1991, nine monk seals were observed at French Frigate Shoals with jaw or head injuries not attributable to natural causes. In response to these reports, on 1 March 1991, the Council requested that the Secretary of Commerce implement an emergency closure to longline fishing within 50 nm of certain NWHI. A temporary closure was established on 18 April 1991. In a 15 May 1991 Biological Opinion rendered by NMFS on Amendment 2 to the FMP, it was further recommended that a moratorium be imposed on all longline fishing within 50 nautical miles of the islands and atolls of the NWHI from Nihoa Island to Kure Atoll. On 14 October 1991, under the final regulations implementing FMP Amendment 3, all longline fishing was prohibited within a 50-nm protected species zone around all NWHI as well as within 100-nm corridors between these banks and islands.

Since the protected species zone was established, there has been no reported or observed incidence of interaction between longliners and monk seals.

Table III-22. Interactions Between Longliners and Protected Species in 1992

Species	No. Released Alive	No. Released Injured	No. Released Dead
Turtle:			
Green Turtle	29	0	0
Leatherback	32	0	0
Loggerhead	2	0	0
Olive Ridley	1	0	1
Hawksbill	1	0	0
Dolphin:	1	0	1
False Killer Whale:	2	0	0
Seabird:			
Albatross	18	8	65
Booby		3	6
Other	5	2	3
TOTAL: N = 180	91 (51%)	13 (7%)	76 (42%)

Data Source: NMFS longline logbook program (unedited data).

Table III-23. 1992 Location of Protected Species Interactions

Species	Inside the EEZ (No.)	Outside the EEZ (No.)
Turtle	11	55
Dolphin	0	2
False Killer Whale	2	0
Seabird	15	85
Other	1	9
TOTAL:	29	151

Data Source: NMFS longline logbook program (unedited data).

Whales

Humpback Whale

In 1991 a humpback whale was observed entangled in longline gear in the NWHI (Dollar 1991) and a second was reported entangled in longline gear off Lanai. There were no longline interactions reported with this species in 1992.

On 2 March 1992, FMP Amendment 5 established a longline area closure of 50 and 75 nautical miles around the main Hawaiian Islands to prevent gear conflicts between longline vessels and troll/handline vessels (57 FR 7661, 4 March 1992). Since the longline prohibited area encompasses most of the humpback whales' primary breeding and calving areas (Molokai, Maui, Lanai and Kaho'olawe), the potential for entanglement with longline gear has been substantially reduced.

False Killer Whale

The Japanese have estimated the loss of their longline catch to killer whales in tropical waters of the Pacific as being around 10% (R. Shomura, pers. com). These whales also have been known to feed on the catch made by Hawaiian longline vessels. In 1990 a NMFS observer reported catch loss by a longliner to a solitary false killer whale on one set in mid-Pacific waters (Dollar 1991).

Dolphin spp

In 1991, there was one report of a longline interaction with a dolphin. Two interactions were reported in 1992 in which an unidentified dolphin, reportedly taken about 500 miles north of the Hawaiian Islands, was released alive; the other animal, reported as a striped dolphin, was taken outside the EEZ and released dead by the longliner.

Turtles

In 1992, marine turtles accounted for 35.5% of the interactions reported in longline logbooks. Interactions with turtles occurred outside the EEZ 83% of the time and 17% within the EEZ. Turtle interactions remained about the same in 1991 and 1992.

The rate of turtles taken within the EEZ remained unchanged at two per million hooks for 1991 and 1992. Although the number of turtles taken outside the EEZ increased between both years, the turtle take rate remained the same at nine per million hooks despite a 40% (1.7 million hooks set) increase in fishing effort from 1991 to 1992 (Table III-24).

Table III-24. Longline-Turtle Interactions Inside/Outside the EEZ

	1991		1992	
	Inside	Outside	Inside	Outside
No. of Takes	15	52	11	55
No. Hooks Set[a]	7,907,650	4,416,036	5,544,475[b]	6,142,106[b]
Takes/1 Million Hooks	1.8	11.7	1.9	8.9

[a] Data source: NMFS, Honolulu Laboratory
[b] Preliminary Data

Green Turtle

In May 1990, a green turtle was observed at French Frigate Shoals with monofilament line similar to longline leader protruding from its mouth (NMFS SWFSC 1990). During 1991, 19 green turtles reportedly were taken by longline gear (Nitta and Henderson, in prep). Logbook data for 1992 showed that 29 green turtles were taken and released alive by longliners, with over 80% of the interactions occurring outside the EEZ. Many of the logbook entries do not distinguish between snagging, entanglement, and capture on baited hooks. There are no data on the survival rate of hooked turtles released alive.

Leatherback Turtle

Leatherback turtles have had the highest number of reported interactions with longliners compared with the other turtle species. In 1991, 38 (58%) of the turtle interactions involved leatherbacks. Also, during a 1991 NMFS research cruise to the NWHI, a leatherback was reportedly hooked and released alive during experimental

longline fishing operations (Skillman and Balazs, in press). In 1992, 32 (50%) of 64 turtles reported taken and released alive by longliners were leatherback turtles.

Olive Ridley Turtle, Loggerhead Turtle, and Hawksbill Turtle

In 1991 seven longline interactions were reported with Olive Ridley turtles (2), loggerhead turtles (4) and hawksbill turtles (1). Interactions during 1992 numbered 5, two Olive Ridley turtles, 2 loggerhead, and 1 hawksbill turtle. Only one of the turtle interactions in 1992 resulted in mortality (one Olive Ridley turtle).

Sea birds (Albatross and Booby)

Seabirds, especially the albatross, reportedly have the highest number of RAID's of all the protected resources observed in interactions with the longline fishery. In 1991, albatross mortality was 116 (78%) of all seabird-associated interactions; in 1992, albatross mortality was lower (91) but still comprising 65% of the interactions. No distinction was made in the logbooks between species of albatross (Laysan or Black-footed).

Incidences of mortality associated with longline gear are attributed to the feeding pattern of albatross where they feed at dusk on squid as a primary food item. Longline fishing vessels targeting swordfish also set their longline gear at sunset and use squid for bait. Albatrosses are attracted to the baited longline gear as it is being deployed and many are hooked and drowned as the line sinks below the ocean surface.

Takes of boobies by longline gear are relatively minor compared to the albatross. Logbook data indicate that interactions with boobies numbered 8 and 9, for 1991 and 1992, respectively. Again, no distinction was made in the logbooks between the booby species (masked or brown).

III.H Habitat Conditions and Trends in Environmental Conditions

Pelagic species that are managed under the FMP are distributed throughout the north, central, and western Pacific oceans generally between the latitudes of 40 - 45^0 N. latitude and 40^0 S. They occupy mostly the surface waters to a depth of at least 250m, but usually stay above the thermocline (WPRFMC 1986). There is no information to indicate that the habitat conditions of the EEZ differ significantly from those described in the FMP (Section 6.8). The introduction of low level pollution from point and non-point sources is ongoing. These sources include runoff from high islands, volcanic eruptions on the seafloor, sewage from island outfalls and ships, oil from ship bilges and accidental spills, and marine debris originating from land or ships. NMFS (Honolulu Laboratory) has conducted some studies on the effects of turbidity on the survival of eggs and larvae of tunas and billfishes as part of a research on the

impacts of manganese nodule mining and processing at sea (NOAA 1984). The preliminary results showed no impact but were considered inconclusive.

There are many federal and state laws to protect habitat conditions in the EEZ and state waters. In 1987, the US Marine Plastic Pollution Research and Control Act (MPPRCA), was enacted to prohibit the discharge of plastics into the EEZ and state waters, and to require all US ports and terminals to provide garbage reception facilities. The MPPRCA directly affects domestic longline vessels in the swordfish fishery because of their use of plastic "luminescent" light sticks to attract swordfish (see section III.C.1.a). In 1992, the Hawaii-based longline vessels used nearly 2.5 million light sticks. Under the MPPRCA and MARPOL Annex V[18], all longliners are prohibited from discarding used light stick plastic casings into the ocean and are required to return them to port for appropriate disposal.

The habitat conditions throughout the EEZ are generally expected to remain at a high quality level with or without the FMP amendment. However, variation in the environment has pronounced effects on pelagic fisheries (Seckel 1972, Mendelssohn and Roy 1986). There is no evidence of any sustained environmental anomaly detrimental to Hawaii's fisheries, but little is known of the environmental factors that affect availability and catchability. A temperature-related decline in skipjack tuna availability in the mid-1970s ended in the 1980s (Boggs and Kikkawa 1993).

Variability in CPUE due to environmental factors creates major problems for stock assessment and optimization of yield (Amendment 4, Appendix A). Quantifying the impacts of fishing pressure on the local abundance of fish is difficult because the effects of environmental variation appear to be much more pronounced than the effects of fishing pressure. No effort limitation scheme will be able to prevent Hawaii's fisheries from experiencing alternating periods of low and high CPUE resulting from environmental variations. The best way for fishermen to overcome highly-localized, environmentally-induced variations in CPUE would be to emulate the distant-water fishing nations and develop highly-mobile fisheries that can operate over a wider range of the Pacific, locating the fish where they are most abundant.

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[18] MARPOL stands for "marine pollution". MARPOL V means Annex V of the International Maritime Organization's Convention for the Prevention of Pollution from Ships which prohibits at-sea disposal of plastics.

IV. POTENTIAL PROBLEMS ADDRESSED BY AMENDMENT 7

The need for action is based on several concerns regarding the Hawaii pelagic fisheries, which might be exacerbated if the current longline moratorium expires without further Council action. These concerns are described below. In many cases, direct evidence that a problem is occurring, or was occurring prior to the imposition of the moratorium, is not available. Testimony at public hearings and the April 1993 Council meeting, however, demonstrated that many people are concerned about these issues. Several projects to examine these issues have recently been funded, but results will not be available for at least two years. Appendix 2 describes important research needs in greater detail.

IV.A. Stock Conservation

For most (if not all) species, Hawaii-based fisheries in and adjacent to the EEZ around Hawaii will not contribute to recruitment overfishing as defined in Amendment 1, nor would management of these fisheries significantly contribute to rebuilding of stocks that might be overfished on an ocean wide basis. Hawaii pelagic landings generally account for less than 5% of the total catch of each stock. The status of these stocks is impacted mainly by foreign and US distant-water fisheries operating outside the Council's jurisdiction. The catch and effort of these other fisheries far exceed those of Hawaii-based fisheries. A possible exception is swordfish, where the Hawaii-based longliners account for about 15% of the total Pacific catch, and 42% of the eastern central Pacific catch. Before the longline moratorium went into effect, Hawaii swordfish landings increased 100-600% for each of the years from 1988 to 1991. This indicates that the Hawaii fishery has the potential to dominate the central Pacific fishery and affect the status of the swordfish stock(s) in the region.

Pacific landings of swordfish may be near MSY (Table III-2), although recent estimates of MSY may be unreliable. There is, however, no evidence of declines in the average size of the swordfish taken, CPUE, or other aspects of the stock(s). Nonetheless, the Atlantic Ocean experience suggests that even a widely distributed species as swordfish can be over-utilized relatively quickly, while evidence of growth overfishing can take a long time to be demonstrated (ICCAT 1992a).

Growth of the swordfish segment of the Hawaii domestic longline fishery was stimulated by over-utilization of swordfish stocks in the Atlantic and continuation of a strong market demand for this species. A production model analysis was recently completed for the first time for North Atlantic swordfish (ICCAT 1992b, NCMC 1993). This model suggests that reduced fishing effort in the Atlantic (down about 30%) resulted in some recovery of the stock, and that fishing effort may have been reduced to MSY levels. However, it may require years for yield to reach MSY at even this reduced level of fishing effort (NCMC 1993). Age-structured stock assessments are generally recognized as superior to production model analyses. The age-structured assessments for Atlantic swordfish also show some recovery of the adult stock but the

adult stock remains 50% less abundant than in 1978 (ICCAT 1992b). Additional longline fishing vessels may wish to home port in Hawaii, and the fairly rapid decline of swordfish stocks in the Atlantic should serve warning of what could conceivably happen in the central Pacific.

The Council is concerned about the relative abundance of wide-ranging stocks within the EEZ and adjacent waters. There is a finite supply of fish in these waters at any time, and uncontrolled harvest by any sector may result in localized decreases in abundance and catch rates to where fishing becomes unprofitable (see catch competition discussion in next section). Even if local fisheries do not affect the status of stocks throughout their range, they can affect abundance and catch rates within the EEZ and adjacent waters. The Council intends to manage growth of the fisheries so that decreases in local fish abundance due to local fishing pressure, will not significantly reduce the ability of fishermen to maintain profitable or satisfying fishing experiences. In the absence of better information, the Council has chosen to manage its fishery resource to optimize yields in the local domestic fisheries. If fish abundance remains above the level that equitably supports all fishery sectors, then any local stocks that *may exist*[1] will also be conserved.

IV.B Catch Competition

Catch competition can be defined as a localized decline in fish abundance and catch-per-unit-effort (CPUE) resulting from increased fishing effort on fish in a localized area. In theory, catch competition can negatively impact a fishery whose effort is expanding, or other fisheries operating on the same stock(s) nearby. In the latter case catch competition is referred to as "fishery interaction" and in either case it can be termed local overfishing. The magnitude (or existence) of catch competition and fishery interaction in Hawaii's fisheries is poorly known. However, the potential problem of catch competition is a major concern.

When the original FMP was being developed, the Council was concerned that established local longline, troll and handline fisheries could be (and possibly were being) adversely affected by catch competition (fishery interaction) with the foreign longline fishery in the EEZ. The implementation of the FMP resulted in the cessation of this foreign longline fishing. An important reason for the adoption of Amendment 4 (three-year longline moratorium) was concern that the rapid growth of the domestic longline fishery to levels equalling or exceeding former foreign fishery harvests could adversely affect CPUE in the local fisheries.

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[1] Knowledge of stock structure is inadequate to completely rule out the possibility of sub-populations of swordfish, yellowfin tuna, mahimahi, or other pelagic species existing within small regions (e.g., in some limited area surrounding Hawaii). If such local populations are identified then stock conservation would acquire greater local importance. However, the distribution of larvae, tag returns, and genetic evidence strongly suggest that any separation of stocks probably exists only on a large scale (e.g., North and South Pacific).

Studies have been conducted that attempt to determine the relationship between changes in longline fishing and catches and catch rates for other gear types in Hawaii. These studies are not conclusive and further work is needed to reach definitive conclusions, but the perception and fear of catch competition (localized overfishing) remains. This stems from a basic understanding that, at any given time, there is a finite amount of fish available to local fisheries. In theory, removal of some of these fish means that until those fish are replaced (by recruitment or immigration), fewer fish remain to be caught by this or another fishery. If there is substantial immigration of fish into the area (or if rapid local production occurs), then the effects of fishing pressure on local fish abundance may be small. However, if the rate of immigration is low, and if the catch is made in an area near the area used by another fishery, then fish may be intercepted before they reach the other fishery. The impacts of catch competition can thus be significant. This is the concern of troll and handline fishermen who generally believe that longline fishing has caused decreases in the troll and handline catch rates and profitability. The establishment of areas closed to longline fishing (Amendment 5) may have helped prevent catch competition to the extent that the longline fishery may catch fewer fish near the troll and handline fisheries.

The Council has defined OY for the pelagic fisheries non-numerically, based on the FMP objectives (see Sec. VII.C). OY is defined with a focus on preventing "local overfishing" or "economic overfishing" within the EEZ of each island area. This reflects the Council's interest in achieving a balance among the fisheries that pursue pelagic species in the Council's area. As the FMP objectives make clear, the Council wishes to promote domestic harvest (within the limits of OY) and enhance the opportunities for domestic commercial and recreational fisheries to be profitable and satisfying, respectively.

This amendment addresses catch competition because it can prevent the achievement of optimum yield (OY) in a local fishery even when the status of the stock throughout its range is unaffected. A quantitative approach for defining OY in local fisheries that exploit wide ranging stocks is given in Sathiendrakumar and Tisdell (1987) and Boggs (in press). This approach conceives of the maximum level of catch as a function of the number of fish immigrating to the area of the fishery. It is similar to a stock production model relating catch to effort, except that catch does not decline at high levels of effort. However, OY can be defined by such a model, just as it is with a stock production model, as the level of effort that produces the greatest net benefit.

The Council must consider possible restrictions on the growth of the longline fishery to the extent that increases in longline fishing may adversely affect other fisheries, or the longline fishery itself. For example, if uncontrolled increases in longline catches of yellowfin tuna, blue marlin and mahimahi were permitted in Hawaii, there is concern that this catch could depress the troll and handline CPUE for these species below profitable levels. There is concern that reduced success rates could also negatively impact the recreational fishing experience. The negative impact of depressed CPUEs for these three species on the longline fishery itself would be small since the present-

day fishery depends primarily on swordfish and bigeye tuna. There is concern, however, that catch competition for swordfish and bigeye tuna within the longline fishery could threaten its profitability.

Several studies have found evidence of catch competition in Hawaii when foreign longline fishing was conducted within the EEZ before 1980 (Lovejoy 1977, 1981, Wetherall and Yong 1983, Skillman and Kamer 1992). These studies made use of foreign fishery data on catch and CPUE within the Hawaii EEZ, and found that CPUE decreased with increases in foreign fishing effort. Analyses of more recent domestic fishery data (Boggs, in press) have not shown evidence of catch competition, even though the current level of fishing effort is higher than it was before 1980. The poor quality of domestic fishery data makes it hard to document catch competition unless it is very intense.

IV.C Market Competition

Another concern has been the impact of increased harvests on the ex-vessel prices of pelagic species landed in Hawaii (i.e., market competition). Such impacts can negatively affect the prices received by fishermen within the fishery with increased effort and catch levels or by other pelagic fisheries that harvest the same species of fish. The price received by fishermen for their fish is influenced by a number of factors including the size and location of the market demand, the number of competing sources of supply (other domestic sources, foreign sources), the amount of product available, the degree to which other species act as substitutes, and the quality of the product.

While earlier investigations were unable to demonstrate a clear market competition between longline and troll/handline caught fish, some impact may exist. There are two dimensions to this potential problem. First, there may be an actual decline in overall revenue to the troll and handline fleets due to downward price pressure as measured on an aggregate annual basis. Identifying what impacts are actually due to increased longline landings is confounded by the fact that skipjack landings by the aku fleet, which vary considerably from year to year, are also major competitors in the same markets as troll/handline caught tuna. Second, there may also be the perception of price declines because of daily or weekly "flooding" of the market by longline catch. These daily or weekly fluctuations in prices may inflict hardship upon individual fishermen, and thus indicate a negative distributional impact of an increase in the longline fishery. However, if there is not an overall decline in troll/handline prices, then the troll/handline fleet is not negatively affected as a whole.

Market competition can also occur within the longline fleet with increased landings. The prices received for longline-caught swordfish have declined during times of large landings due to the increased supply available. Again, the prices received will be influenced not only by the Hawaii landings at a given time but by the amount of other domestic harvests (e.g., the Atlantic fishery) and foreign supplies.

IV.D Gear Conflict

The "gear conflict" problem was the primary focus of Amendment 5 which created area closures around the main Hawaiian Islands[3]. Many of the newly-arrived longline vessels were fishing in areas traditionally frequented by troll and handline boats, and fished in a different fashion (shallower sets, perpendicular to shore and near to fish aggregating devices (FADs)) than the longliners already in the area. These methods tended to cause direct gear conflict with troll and handline boats, most of which fish within 20 miles of the islands. Amendment 5 separated the fleets and ended most of the problem.

However, there is an additional component to the gear conflict problem. The availability of swordfish has evidently proved to be sufficiently concentrated at some times to where gear conflicts among longliners have occurred. The same pressures which might lead to gear conflicts with the offshore handline fishery might also exacerbate these intra-longline fleet gear conflicts, particularly if the fishery were to return to open access.

IV.E. Risk of Over-capitalization

Although most existing fisheries in the United States are fully-utilized, the Hawaii longline fishery is still developing. The rapid growth from 1987-90 and the shift of the primary target species to swordfish typify this development. The current moratorium was instituted because the rapid growth of the Hawaii longline fleet prompted concern that the rate of growth was exceeding the ability of the Council to respond to problems which might arise. It was also exceeding the ability of NMFS to track and analyze the economic and biological implications of the increase in fishing effort and catch. The Council explicitly identified off-setting continued instability in the Hawaii pelagic fishery (longline, troll and handline) as an objective of the moratorium.

Instability caused by rapid growth of the longline fleet involves three kinds of management risk: (1) over-fishing (probably limited to swordfish), (2) decline in CPUE (all species), and (3) economic over-capacity. The first two are discussed in the previous sections. The third relates to the risk of over-capitalization.

If the fishery returns to open access, a significant increase in the number of longline vessels and effective effort would be expected. Most recent information concerning the Atlantic swordfish stocks indicates they are not as close to recruitment overfishing as originally estimated, but the fishery remains growth overfished and the Atlantic fleet is over-capitalized. Interest in the Hawaii fishery still exists within the Atlantic fleet, and many Alaska vessels, facing increasingly restricted fishing opportunities, are

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[3] "Gear conflict" is defined as the crossing and tangling of lines, fishing vessels being forced off course by the fishing activities of other fishing vessels, and related physical interactions between fishing vessels.

looking toward the western Pacific. While the Pacific swordfish fishery is currently under-utilized, long-term, uncontrolled growth will increase the risk of over-capitalization in the fleet (i.e., excess harvesting capacity to harvest the available stock). Thus, a level of effort could be reached where the Pacific fishery, like the Atlantic, could become over-utilized. Such over-capitalization would lead to much reduced profitability to individuals, decreased economic benefits to the nation and increased need for restrictive management measures.

Limitation of the Hawaii-based fleet will not halt the growth of the domestic fishery, however. In 1993, four vessels based in Alaska began fishing North Pacific swordfish grounds. Another 40 vessels have indicated their intent to relocate from the Gulf of Mexico to California and longline beyond the EEZ for pelagic species.

IV.F Bycatch Issues

The term "bycatch" is used in fishery management to cover several issues. Bycatch can mean a species caught in conjunction with other targeted species, but is discarded because of limited commercial value. The catch of most shark species in the longline fishery is an example of this type of bycatch. In 1992, almost 95,000 sharks were caught by Hawaii-based longline fishermen, but only about 3,600 were retained. The majority of sharks released from longline gear on research cruises have been alive and it is unclear whether shark bycatch poses a problem for the shark stocks.

A second category of bycatch is a species that is caught incidentally in one fishery, but is a target species in another fishery. The incidental catch of blue marlin by longlines (and possible the commercial troll fishery) and the targeting by more-recreational troll fisheries is an example. Blue marlin brings a low price and is not targeted by commercial fishermen, but the species is highly regarded by sport fishermen for its recreational value, which likely exceeds its commercial value. The rate of incidental catch of blue marlin in the longline fishery varies considerably, depending on the type of longline trip. Blue marlin catch rates are higher in the summer and coincide with higher catch rates for yellowfin tuna. Blue marlin catch rates are lower in the winter when longliners target bigeye tuna and swordfish. Therefore, while any increases in the number of longline trips could increase blue marlin bycatch, the amount of increased harvest would depend on the targeted species. Changes in fishing strategies of existing vessels (i.e., upgrading operations in order to fish in more distant water swordfish grounds) could decrease the amount of blue marlin bycatch.

The Council sponsored a blue marlin workshop in April 1993 to discuss the scope of the blue marlin problem and to identify means to address these concerns. Participants included both scientists and industry members. One of the recommendations made by workshop participants was to continue some sort of effort

limitation program for the longline fishery, while collecting information to determine whether there is basis for concern related to blue marlin.

IV.G Protected Species Interactions

As indicated in section III.G., the longline fishery is known to take marine turtles. In 1991, the take of turtles reported by longline fishing vessel operators exceeded the incidental take level authorized in the 1991 Biological Opinion and Incidental Take Statement for the longline fishery. As a result, NMFS re-initiated consultations under section 7 of the ESA, and a new Biological Opinion (Opinion) and an Incidental Take Statement (Statement) were issued on 10 June 1993 (see Appendix 3).

The Opinion concluded that the activities conducted by longline fishing vessels under the FMP are not likely to jeopardize the continued existence of any threatened or endangered species of sea turtles during the 12 months that the Opinion is in effect. However, the fishery adversely affects five species of sea turtles, and the take that is authorized under the Statement may not be sustained on a continuing basis without the risk of jeopardizing the species' continued existence. The Opinion is to be in effect for one year, and consultations will be reinititiated in June 1994. The Opinion and Statement authorize an incidental take of 752 turtles, with a mortality level of 299 animals. No more than 150 leatherback turtles may be taken in a manner that is observed to result in mortality or serious injury.

The Opinion presented three conservation recommendations:

1. NMFS should undertake research to determine the fate of turtles released alive after being taken incidentally in the fishery.

2. NMFS should propose that the Council develop a FMP amendment to preclude increases in effort until NMFS has determined that incidental turtle mortality is being managed at a level that will not preclude recovery and that increased effort will not result in increased sea turtle mortality.

3. NMFS should initiate discussions with the Department of State to lead to the exchange of data with other nations whose vessels fish with longline gear in the Pacific.

These conservation recommendations are not legally binding, but NMFS has indicated a commitment to carry them out to the extent practicable.

In addition, the Statement presents a number of "Reasonable and Prudent Measures," including:

1. NMFS shall establish a voluntary observer program within 30 days and a mandatory observer program as soon as practicable. Observer coverage shall

be sufficient to produce statistically significant results and to evaluate the accuracy of logbook data submitted for the fishery. A sampling design shall be prepared within 60 days for the observer program.

2. An automated vessel monitoring system shall be implemented as part of this program to verify the location of "non-observed" vessels and to help verify the accuracy of logbook reports.

3. NMFS must evaluate observer information quarterly and other information when available to determine if the incidental take level should be modified or if other management measures need to be implemented to reduce the take.

4. NMFS shall evaluate methods and experimental designs that can be used to determine the fate of turtles released alive after being incidentally taken in the longline fishery.

Unlike the conservation recommendations, these measures are legally binding. If they are not followed, the incidental take of turtles would be prohibited. Individual fishermen could be prosecuted for taking turtles, or the fishery could be curtailed or closed.

The Council was not included in the Section 7 consultation, even though they requested to be, and did not receive a copy of the Opinion and Statement until after the initial preferred alternative had been selected for public review in the draft amendment. The Council discussed the Opinion and Statement at its September 1993 meeting, and was presented with NMFS recommendations both for Amendment 7 and for complementary actions. None of the measures specifically applies to the Council and Amendment 7, but the Council shares NMFS' concern for the status of sea turtle populations and for adequate protection from excessive take. In the context of Amendment 7, the Council's overall goal in limited entry to the longline fishery is to ensure that this fishery does not expand to the point where there are adverse impacts on fish stocks, protected resources, on other fisheries, or on the fleet. The Council's complementary action to request the Regional Director establish a mandatory observer program through framework procedures of Amendment 3, and to establish a VMS requirement also support achievement of the required reasonable and prudent measures in the Statement.

The Council requested that its SSC review the Opinion prior to the September Council meeting, at which time NMFS formally presented their recommendations related to the Opinion and Statement to the Council. The SSC review is attached as Appendix 4.

IV.H Problems Which Have Occurred During The Current Moratorium

IV.H.1. Safety concerns

The moratorium prohibits vessel owners from replacing their vessels with vessels that might have greater harvesting capacity (usually meaning larger vessels). This restrictions on upgrading has raised safety concerns. When the longline moratorium was first instituted, there were no closed areas around the main Hawaiian islands. The subsequent area closures prohibited any longline fishing within 75 nm of Oahu and the islands of Kauai County and within 50 nm of the four islands of Maui County and the island of Hawaii. Small vessels which had formerly fished closed to shore are now required to travel far offshore in order to fish. Safety concerns due to the size limitations and, in some instances, the vessel condition, have limited or eliminated the ability of some permit holders to fish.

The swordfish fishery is conducted mostly in international waters, often up to 2000 miles from Hawaii. In order to participate safely in this fishery, a number of permit holders wish to increase the size of their vessels. Such upgrading is not currently allowed, increasing the likelihood that some longline fishermen may decide to fish under unsafe conditions. In addition to the safety issue, many current permit holders feel that the restrictions on upgrading unfairly constrain their ability to operate effectively in the currently underutilized swordfish fishery.

IV.H.2. Increased Uncertainty Due to Permit Transfer Rules

The moratorium regulations allow the transfer of a permit only once, and only with the sale of a vessel. A change in corporate ownership of 50% or more constitutes a transfer. This has adversely affected vessel owners, and potential owners, in their ability to plan and run their businesses, because the sale or purchase of a permitted longliner (a primary business asset) is severely restricted under the one-time transfer provision. Under the regulations, restructuring of a corporation or disposition of property (i.e., vessel) in divorce proceedings involving individuals who are 50% joint tenants of the vessel is restricted or made more complicated by the 50% transfer rule. Under the moratorium, the initial permit holder can at best provide a non-transferable permit to a prospective buyer. During the moratorium, 36 permits (21%) were transferred, making impossible any further sale or major change in corporate ownership without invalidating the permit. This constraint has also severely limited the opportunities for vessel owners to obtain financing.

IV.H.3. Administrative Difficulties

Two problems have become apparent during the administration of the current moratorium. The first relates to monitoring changes in corporate ownership or partnership. To determine if changes in corporate ownership of 50% or more have taken place, all individuals and shares in a corporation or partnership must be

monitored. This is a virtually impossible task, considering that 62% (103) of the longline vessels are currently owned by corporations or partnerships, and are registered in eight different states. The regulations define an owner as the entity listed on the Coast Guard vessel documentation. If this is a corporation, the Coast Guard records usually do not show any change in ownership unless the name of the corporation changes, thus making the vessel owners responsible for reporting ownership changes, without the ability to cross-check with Coast Guard files.

Second, Hawaii longliners are required to carry two types of longline permits, general and limited entry, which have resulted in some confusion to the fishermen and additional administrative workload for the NMFS.

IV.H.4. Flexibility of Management Actions

The time required to implement regulations under the current FMP gives rise to another set of problems. To be effective, fishery management must be able to respond in a timely manner to respond to changes in the fishery. This need has been recognized in framework procedures that allow changes in the area closure regulations, without having to go through the amendment process. However, the process still limits the ability to take timely action because all changes must go through at least three and possibly four stages of public review. The Council must discuss (with an opportunity for public comment) and agree that action is needed and must complete the necessary documentation, requiring at least two meetings. The proposed rule must be published by NMFS with an opportunity for public comment. The final rule cannot be made effective until the end of a 30-day delayed effectiveness period (sometimes waived) intended to allow interested parties to consider and comment on the final action being taken.

To compound the potential difficulty, the Magnuson Act does not set statutory limits on the amount of time that can be taken to promulgate rules under the regulatory amendment procedures. Further, all regulatory actions under framework procedures are considered to be equally significant in terms of process, regardless of the importance or scope of the action. For example, a minor change in reporting requirements would be considered in the same manner as a major change in the longline area closures. A case in point was the modification of the MHI longline area closures. The Council began discussing possible modifications in December 1991 and took final action to request a season change in the size of the area closure in March 1992. This request was submitted to NMFS for implementation through the regulatory amendment process in April 1992 but still had not been formally published in the Federal Register as a final rule by October 1992 when the modification was to begin. This caused a great deal of uncertainty for the fishermen and required a special last-minute announcement to be made to assure fishermen they could begin to fish in the newly opened areas without penalty.

Because of the uncertain timing of regulatory changes, fishery participants may also find it difficult to plan ahead and may either defer or accelerate fishing activity, investments or other actions to take maximum short-term advantage under the regulations in place or to minimize the risk of adverse action if new regulations are somehow rejected. It is rarely in anyone's interest to have a long period of uncertainty before an action can be put into effect.

Finally, the Council has been hindered by the timing of emergency actions and subsequent amendments to incorporate measures into the FMP on a long-term basis. Emergency measures can be in place for only 180 days, the same amount of time allowed for the amendment review process, after it leaves the Council. This has significantly increased the risk for a lapse in regulations after the emergency regulations expire and before the amendment regulations are published as final rules in the Federal Register. This leads to increased public dissatisfaction with the Council process which would be reduced through the use of a framework process.

V. DESCRIPTION OF PROPOSED ACTIONS AND REJECTED ALTERNATIVES

V.A Effort Limitation Alternatives

V.A.1. Proposed Limited Entry Program

Amendment 7 proposes to implement a limited entry program to replace the current moratorium on new entry into the Hawaii longline fishery when it expires in April 1994. Permits would be issued to all limited entry permit holders whose vessels made at least one landing in Hawaii of longline-caught fish during the moratorium. People with moratorium limited entry permit for vessel less than 40 feet long, or with limited entry permits based on the lobster fishery criterion, would be exempt from the landing requirement to qualify for a new permit. If an individual or corporation has more than one permit, new permits would be issued for each qualifying permit.

Permit holders would be allowed to upgrade their vessels or replace their vessels, provided that the vessel used to fish under the permit is no longer than the longest vessel which was active during the moratorium (93 feet as of December 1993). Permits would be transferable, with or without the sale of the vessel, subject to the restriction on vessel upgrading.

V.A.2. Rejected Alternatives

Among the elements that can be manipulated to carry out a limited entry program are: the number of limited entry permits, permit transferability, vessel upgrade rules and, applying limited entry differentially to separate sectors of the fleet or in different areas. While there are 24 possible combinations of these elements plus the open access situation, the Council focused discussions on the following four alternatives. One of these was the preferred alternative until the September 1993 Council meeting when the Council developed the proposed limited entry program. The five alternatives which were discussed and rejected are described below.

V.A.2.a. Limited entry with fleet-wide harvesting capacity not to exceed the maximum capacity that was allowed during the moratorium.

In September, the Council decided that the maximum harvesting capacity which was allowed during the moratorium should not be exceeded under the new limited entry program. Under this alternative, permit holders would have been allowed to upgrade their vessels or replace their vessels provided that the cap on total harvesting capacity was maintained. This would likely have required permit holders to obtain harvesting capacity units from another permit holder. Permits would have been transferable, with or without the sale of the vessel, subject to the restrictions on harvesting capacity. The initial issuance of permits would have been based on the same eligibility criteria described for the proposed limited entry program.

The Regional Director, working with the longline industry and Council staff, was directed to develop a definition of harvesting capacity, a determination of the maximum harvesting capacity allowed during the moratorium and a system for allowing vessel upgrades while maintaining the cap on harvesting capacity (as defined). These determinations were to be presented to the Council for approval in December so that a method for allowing upgrades and permit transfers would be in place when the limited entry program was implemented.

Through examination of available data and discussions with industry members it became evident that measuring the harvesting capacity of an individual vessel was extremely difficult, if not impossible. Harvesting capacity is related to the potential ability of a vessel to harvest fish under optimal conditions. Therefore, actual landings will almost always be less than the maximum possible. Analysis performed examined annual landings by vessel but was unable to show a good relationship with any physical vessel characteristic. There was no agreement on how to define or measure harvesting capacity. Therefore, no mechanism could be developed to make this alternative operational and allow permit transfers and vessel upgrades needed to relieve problems encountered by the industry under the moratorium. Given this situation, and the fact that there is no evidence of pelagic species stock concerns or catch competition, the Council rejected this alternative in favor of placing an upper limit on vessel upgrades.

V.A.2.b. Limited entry with free transferability and no harvesting capacity restrictions (the Council's original preferred alternative)

Permits would be issued to existing Hawaii limited entry permit holders, or the last permit holder of record in the case where a permit was no longer valid due to more than one transfer. These permits would allow the holder to fish for (or transship) pelagic species with longline gear, either within or outside the EEZ surrounding Hawaii, as well as land their catch in Hawaii ports. Permits would be freely transferable (with or without their vessel). Permit holders would be allowed to upgrade their replacement vessels or modify existing vessels with no restrictions on harvesting capacity. The ability to modify effective effort in the longline fishery through the use of frameworked adjustment mechanisms was also an integral component of this effort limitation alternative.

The Council decided that some limits on vessel upgrading would be prudent and rejected this alternative in favor of the proposed limited entry plan.

V.A.2.c. Extend the current limited entry (moratorium) regulations

This alternative would have continued the moratorium regulations. Only those people who were originally issued a Hawaii limited entry (moratorium) permit, or obtained a permit through a one-time transfer during the moratorium period would be granted new permits. The one-time only transfer rule would continue; only those permits which had

not been transferred during the April 1991-94 period would be allowed to transfer once with the sale of the vessel. A 50% or more change in the ownership of a corporation holding a permit would constitute a transfer. A permit holder could replace his or her vessel as long as the NMFS Regional Director determined that the replacement vessel is of equal or less harvesting capacity than the original vessel.

This alternative was rejected because the Council determined that the permit transfer and vessel replacement rules were causing undue hardship for the longline community.

V.A.2.d. Dual permit system

This alternative involves establishing two classes of longline limited entry permits. One would be the same as under the Council's original preferred alternative (V.A.2.a) and would be awarded to persons qualifying for permits under the current moratorium (Class "A" permits). The other would be awarded to new entrants allowed to fish only outside the Hawaii EEZ and may require them to carry VMS equipment (Class "B" permits). The reason for the two classes would be to provide for separate management and development of the Hawaii-based longline fishery in the face of uncertainty.

This alternative assumes that some expansion of the fishery is consistent with the FMP's objectives. Within the EEZ, the assumptions in accepting this alternative are the same as for the Council's preferred alternative. While it is not known how much the fishery can be allowed to expand, it is assumed that impacts will be discernable at some level of fishing effort and that an effort limitation plan will eventually have to be in place to reduce effort and obtain OY. Hence, Class A permits would be fixed at 166, except for minor adjustments that might become necessary as more data became available. Class B permits would be allowed to increase until fishery interaction, with fisheries within the EEZ, or over-utilization of a particular resource became apparent. At such time the number of Class B permits would be reduced using frameworked adjustment mechanisms identified in this amendment.

Class B permits would provide for collecting data on the status of the resources and fishery interaction as the fishery developed. These Class B permits could be required of boats fishing in central Pacific waters of the region but based elsewhere. The Council decided that expansion through the use of B permits is not desirable at this time.

V.A.2.e. Open Access

Under this alternative, the current limited entry program would lapse, and the fishery would return to open access in April 1994. There would be no limit on the number of general permits available, nor would there be any restrictions on the harvesting capacity of the vessels used in the fishery.

V.B. Framework Adjustment Mechanisms and Procedures

V.B.1. Proposed Comprehensive Framework Process

The Council proposes to implement a single set of framework procedures that can be used to adjust the pelagics fisheries management program without having to go through a FMP amendment process except for controversial measures. Regulatory measures are categorized as "established" and "new". Established measures are those that are or have been in place for various sectors of the fisheries, such as longline fishery permits, reporting requirements, and area closures. New measures would be those not yet in place but potentially available for future application, such as harvest guidelines, permits for new classes of vessels, or reporting requirements for new sectors of the fisheries. After its first application, a "new" measure would be categorized as an "established" measure for the gear(s) or sector(s) involved. Controversial measures are those for which there is a great deal of dispute and concern. In these cases, there is a good likelihood of challenge on substantive or even procedural grounds because of the expected or perceived adverse impacts that might result from the action. Therefore, controversial measures would be implemented through plan amendments.

V.B.1.a. "Established" Measures

An established measure is one which applies to one or more sectors of the fishery and has been implemented by rulemaking procedures in the past. The estimated and potential impacts of the measure have been evaluated in past plan amendments or associated documents. The people and organizations participating or interested in the fisheries have had several opportunities to review and comment on the need for and impacts of the measures and are familiar with the measures. It is known that there could be proposals for occasional adjustments in the measures. In this context, adjustment means such things as changes in the size or seasonality of longline area closures, reporting requirements, criteria for area closure exemptions, or gear marking. An adjustment must be consistent with the original purpose of the measure being adjusted and the impacts of the adjustment must be within the range of the impacts considered when the measure was first proposed and implemented.

If this amendment, including the proposal to establish comprehensive frameworking procedures, is approved by the Secretary, then all components of the limited entry program would become "established" measures and any one of them could be changed through these revised framework procedures. Thus, adjustments in the number of vessels, permit transfers, or vessel upgrading could be made under framework procedures for established measures. However, implementation of specific new effort control programs such as quotas, fractional licensing or establishing new "B" permits could only be implemented under procedures for "new" measures or possibly "controversial" measures. In addition, if the complementary actions are approved by the Secretary to provide observer placement authority to the Southwest

Regional Director, and to establish VMS requirements for Hawaii-based longline vessels, then those requirements could be modified under the established measures framework procedures.

Procedure for Changing Established Measures

The framework procedure to allow rapid adjustments in established measures, is as follows:

1. The Council would identify a problem that may warrant action. This will usually be through the annual report prepared by the Council-appointed Pelagics Plan Team by 30 June of each year. The annual report covers the following topics:

   (i) Fishery performance data;
   (ii) Summary of recent research and survey results;
   (iii) Habitat conditions and recent alterations;
   (iv) Enforcement activities and problems;
   (v) Administrative actions (e.g., data collection and reporting, permits);
   (vi) State and Territorial management actions;
   (vii) Assessment of need for Council action (including biological, economic, social, enforcement, administrative, and State/Federal needs, problems, and trends).

   A problem may also be identified by a separate report from the Pelagics Plan Team, the Advisory Subpanel, Pelagics Review Board, enforcement officials, NMFS, concerned pelagic fishermen or other sources. Such a report would include specific information which indicates a problem exists, an examination of possible approaches to resolve the problem, and a recommendation for Council action or additional study.

2. Potential problems warranting further investigation and action may be identified by a number of criteria, including but not limited to significant changes in:

   (i) Mean size of the catch of any species;
   (ii) The estimated ratio of fishing mortality to natural mortality for any species;
   (iii) Catch per unit of effort by any sector;
   (iv) Ex-vessel revenue of any sector;
   (v) The relative proportions of gear in and around the EEZ around Hawaii;
   (vi) The rate of entry/exit of fishermen in any Hawaii fishery;

(vii) Net revenues for a significant percentage of trips for any sector;
(viii) Total pelagics landings in Hawaii;
(ix) Species composition of the pelagics landings in Hawaii;
(x) Research results;
(xi) Habitat degradation or environmental problems; and
(xii) Level of interactions between pelagic fishing operations and protected species in the EEZ or surrounding waters.

3. The Council may consider a wide variety of adjustments to the components of the limited entry program as well as other management measures (e.g., area closures) in effect, and may propose adjustments to measures other than limited entry permit limitations to regulate longline effort and/or catch, including but not limited to:

(a) General longline fishing permit requirements;
(b) Hawaii longline limited entry permit requirements, including changes in permit transferability and vessel upgrade regulations;
(c) Longline reporting requirements;
(d) Longline area closures;
(e) Longline gear marking;
(f) Longline observer requirements;
(g) Longline permit fees;
(h) Species in the management unit;
(i) Access to Hawaii ports by non-permitted U.S. longline vessels;
(j) Harvesting capacity unit definition and management system; and
(k) VMS requirements for longline vessels.

4. The Council would discuss at its next meeting whether adjustment of existing conservation and management measures would resolve the problem. The notice to the public and news media preceding the meeting would indicate that the Council intends to discuss and possibly recommend regulatory adjustments at its meeting through its framework process for established measures to address the issue. The notice would summarize the issue(s) and the original basis for setting the regulation being reviewed and would refer interested parties to the document(s) pertaining to the issue.

5. Based on the discussions at the meeting, which could include input from the Pelagics Plan Team, Advisory Subpanel, Pelagics Review Board, Scientific and Statistical Committee, or other Council organizations, the Council would decide whether to recommend action by the Regional Director. The Regional Director would be asked to indicate any special concerns or objections to the possible

actions being considered under the framework process and, if there are any concerns or objections, will be asked for ways to resolve them.

6. If the Council, after discussing the problem (including opportunity for public comment at the meeting), decides to proceed, a document would be prepared describing the problem and the proposed regulatory adjustment to resolve the problem. The document would demonstrate how the adjustment is consistent with the purposes of the established measure and that the impacts had been addressed in the document supporting the original imposition of the measure. The document would be submitted to the Regional Director with a recommendation for action. The Council may indicate that it intends for the Regional Director to either approve or disapprove the entire proposal.

7. If the Regional Director approves the Council's recommendation, the Secretary is expected to waive for good cause the requirement for prior notice and comment in the Federal Register and would publish a "final rule" in the Federal Register, which would remain in effect until amended. This does not, however, preclude the Secretary from deciding to provide additional opportunity for prior notice and comment, but contemplates that the Council process will satisfy the requirements of the Magnuson Act and Administrative Procedures Act. Again, it is emphasized that established measures are measures that have been evaluated and applied in the past, and adjustments are meant (a) to be consistent with the original intent of the measure and (b) to have been within the scope of analysis in previous documents supporting the existing measure.

8. If the proposal is disapproved in whole or in part, the Regional Director shall provide an explanation of the reasons for disapproval and recommendations to resolve any identified problems. A revised proposal shall be dealt with as if it were a new proposal, but the earlier consideration by the Regional Director will increase the likelihood that the proposal (if approved) can be implemented through a single rulemaking.

Initial Designated Established Measures

The FMP contains a number of conservation and management measures for the pelagic fisheries which are to be categorized as established measures. Most of these apply to the longline fishery, with special emphasis on longline fishing based in Hawaii, as this is the largest (in terms of landings and landed value) and most rapidly changing sector of the pelagic fisheries in the western Pacific. If this amendment is approved, the established measures will be:

(i) General longline fishing permits (all areas except Hawaii)
(ii) Longline limited entry permits (Hawaii only) and associated rules regarding permit eligibility, permit transfers, and limits on vessel upgrading

(iii) Longline reporting requirements
(iv) Main Hawaiian Island longline area closures (with possible exceptions)
(v) NWHI longline area closures
(vi) Longline gear marking
(vii) Notification of longline landings
(viii) Permit fees not to exceed the cost of permit administration
(ix) Access to Hawaii ports for non-limited-entry-permitted domestic longline vessels
(x) Species in the management unit

In addition, through complementary actions taken by the Council, requirements concerning longline observer placement authority and VMS equipment for the longline fleet will be in effect. These requirements could be modified under the framework process for established measures if this amendment is approved.

Purposes for established measures

The above measures have been instituted for a number of reasons. The longline fishery grew extremely rapidly between 1987 and 1992, from a fleet of less than 50 vessels to a fleet of more than 160 vessels with limited entry permits. Many of the new entrants into the fishery were unfamiliar with ocean conditions around the Hawaiian Islands or with other pelagic fishery sectors based in Hawaii and other western Pacific areas. They also were unfamiliar with conditions in the NWHI and the potential risk of interactions with such protected species as Hawaiian monk seals. Among the results of the increased longline fishery were direct gear conflicts between longline and other gear sectors and interactions with Hawaiian monk seals. In addition, there was concern that the increased catch by longline vessels would result in localized reductions in availability of pelagic species to other sectors, with consequent loss of income to fishermen and disruption of markets in Hawaii. There also was concern that the increased longline catch could have effects on the status of stocks taken by longline gear. The database was inadequate to assess these potential impacts.

In summary, the selected conservation and management measures, including those proposed for implementation through Amendment 7, were imposed for one or more of the following purposes:

1. Collect and analyze data to determine impacts of current and alternate regulations on the stocks, on different fishery sectors, and on protected species.

2. Protect species for which there were special conservation concerns.

3. Prevent direct gear conflicts with minimum economic hardship for participants in the restricted fishery sector.

4. Maintain the value of established pelagic fisheries.

5. Cap potential effort through limits on participation and vessel upgrading until it is determined whether increases or decreases are needed to achieve OY from the fishery.

Any changes in management measures under the framework for established measures must be consistent with one or more of these purposes. A change in objectives may not be made under the framework for established measures.

If the action to implement the longline VMS requirement is approved, then the purposes of that action will be added to the purposes for future action under the framework for established measures.

V.B.1.b "New" measures

A new measure is either a measure that has not been used before (e.g., quotas) or a measure that, while previously applied, would be applied to a new fishing sector or gear type for the first time (e.g., federal reporting requirements for purse seine vessels in the management area). A new measure may have been previously considered in a past plan amendment or document, but the specific impacts on the persons to whom the measure would newly apply have not been evaluated in the context of current conditions. This framework procedure proposes that new measures can be implemented only after at least two Council meetings and publication in the Federal Register of a summary of the issue and Council deliberations between meetings with an indication that the Council may take final action at its subsequent meeting. The action, if ultimately approved by the Regional Director, could be implemented by a final rule without need for further comment, but this does not preclude rulemaking by notice and comment procedures if that approach is deemed suitable by the Regional Director.

This approach recognizes that a new measure is by definition a first application of a new measure either to the entire fishery or to a sector of the fishery, or the first application of an established measure to a new sector of the fishery. The nature of such a first time application requires that there generally be sufficient opportunity to (a) notify the people who would be newly affected by the issue, (b) deliberate alternative ways to address the problem, (c) discuss the estimated impacts of a chosen approach on the sector being affected, other sectors, and the stocks involved. A new measure may previously have been evaluated but not selected by the Council for application, or it may not have been evaluated in terms of the sector to which it would possibly apply if action is taken. Therefore, it is incumbent on the Council and NMFS to ensure full debate on the problem and alternative solutions. While the Council would be expected to request the involvement of all who are known to be interested in the issue, there may be some interested parties who do not have the means for direct participation through Council meetings or who might not be informed solely through

distribution of Council documents. Therefore, publication of the information notice prior to the Council taking final action is necessary to ensure that the Magnuson Act, Administrative Procedure Act, and other applicable law are followed.

Procedure for Implementing New Measures

The procedure for a "new" measure is as follows:

1. A Plan Team report (either an annual report or a separate report), input from advisors, or input from NMFS or other agencies will first bring attention to a problem or issue which needs to be addressed at the next Council meeting. In its notice announcing the meeting, the Council will summarize the concern or issue raised, the party that has raised the problem, and the extent to which it is a new problem or a problem that may require new management measures. The Council will seek to identify all interested persons and organizations and solicit their involvement in discussion and resolution of this problem through the Council process, and the Council meeting notice in the Federal Register will emphasize that this problem will be discussed and that proposed actions may result. The indicator of a problem may be any of the criteria listed in section 2 of the framework procedure for established measures.

2. The document presenting the problem to the attention of the Council would be distributed to all pelagics advisory groups of the Council who have not yet received it with a request for comments. The document also will be distributed to the Council's mailing list associated with the Pelagics FMP to solicit inputs and to indicate the Council will take up the action at the following meeting. Prior to the Council meeting, the Council Chairman may request that the Pelagics Standing Committee, review the comments (if any) of the Plan Team, Advisory Subpanel, Pelagics Review Board and SSC, and develop recommendations for Council action.

3. At the meeting, the Council would consider the recommendations of the Pelagics Standing Committee and other Council advisory groups and would take comments from the public concerning the possible course of action. If the Council agrees to proceed with further action under the framework process, the issue would be placed on the agenda for the following meeting. A document describing the issue, alternative ways to resolve the issue, the original preferred action, and the anticipated impacts of the preferred action, would be prepared and distributed to the public with a request for comments. A notice would be published in the Federal Register summarizing the Council's deliberations and preferred action and indicating the time and place for the Council meeting to take final action.

4. In its notice for the following meeting, the Council would indicate that the Council may take final action on the possible adjustment to regulations under

the framework process. At the meeting, the Council would consider the comments received as a result of its solicitation of comments and take public comments during the meeting on the issue or problem. The Council would consider any new information presented or collected and analyzed during the comment period. The Regional Director would be provided a specific opportunity to indicate any objections or concerns about the possible adjustment, and would be asked for ways to remedy any objections or concerns. The Council then would decide whether to propose a new measure under the framework process.

5. If the Council decides to proceed, the Council would submit its proposal to the Regional Director for consideration. The Council may indicate its intent that the Regional Director consider the entire proposal in its entirety and that the proposal be either approved or rejected in full. If the Regional Director concurs in the proposed action(s), the Secretary is expected to waive for good cause the requirement for prior notice and comment in the Federal Register and publish a "final rule" which would remain in effect until amended. Nothing in this procedure is intended to preclude the Secretary from deciding to provide additional opportunity for prior notice and comment in the Federal Register, but it is contemplated that the Council process (which includes two Council meetings with opportunity for public comment at each) would satisfy that requirement.

6. If a new action is approved and implemented, future adjustments may be made under the procedure for established measures.

7. If the proposal is disapproved in whole or in part, the Regional Director shall provide an explanation of the reasons for disapproval and recommendations to resolve any identified problems. A revised proposal shall be dealt with as if it were a new proposal, but the earlier consideration by the Regional Director would increase the likelihood that the proposal (if approved) can be implemented through a single rulemaking.

If the proposed action is adopted and implemented by Federal rules, then the framework process could be used to implement "new" measures such as permits, reporting requirements, or area closures for non-longline fishing sectors; or fractional licensing of the longline fishery, issuance of "B" permits, quotas, trip limits, or other catch or effort limits for the longline fishery or any other sector of the pelagics fisheries. Some examples of "new measures" can be found in Appendix 5.

Purposes of New Measures

New measures being promulgated under this procedure must be consistent with the objectives of the FMP, and the impacts of the measures in terms of FMP objectives must be evaluated explicitly in the documentation supporting the proposed change.

An action not consistent with the objectives of the FMP can only be implemented through amendment of the FMP to revise the objectives. Any new purpose approved through this framework procedure becomes a purpose which could subsequently warrant action under the framework procedure for established measures.

V.B.1.c. Controversial Measures

These are measures which are highly controversial for the entire fishery or a substantial sector. Examples include establishment of limited entry for a new sector or application of vessel monitoring system requirements to a new sector. Such measures would not have been considered or evaluated in any detail in the past, and a framework process is not suited to dealing with such issues. Any such decisions would be through a fishery management plan amendment. It would be the responsibility of the Council to complete the documentation needed to ensure public participation, full evaluation of alternatives, and completion of public hearing and review requirements under the Magnuson Act and other applicable law. The advantage of this approach is that the statutory timetables under the Magnuson Act would expedite the timely approval or disapproval of any proposed actions dealing with controversial issues.

V.B.2. Rejected Alternatives

V.B.2.a Framework Limited Entry Regulations Only

The Council also discussed establishing framework procedures only for modifications of the limited entry program. These would have resulted in four separate framework processes under the FMP (Amendment 3, modifications of protected species-related regulations; Amendment 4, implementation and changes to vessel tracking systems; Amendment 5, MHI area closure adjustments; and Amendment 7, modifications to the limited entry program). In choosing the proposed course of action, the Council decided to simply the FMP by implementing one, comprehensive framework process.

V.B.2.b Status Quo

Under this alternative, no new framework procedures would be included for the limited entry program. Existing framework procedures could be used to adjust through rulemaking the NWHI or main Hawaiian Islands area closures, or to change the criteria for allowing exemptions to MHI closures, including the publication of proposed and final rules as now occurs. Regulatory amendments could continue to be used to carry out minor changes in such areas as gear marking, reporting requirements, and permit documentation requirements. However, most rule changes, including adjustments to the longline limited entry program, would likely require a minimum of 150 days, including at least one Council meeting, a proposed rule stage with a comment period of 30 days, a final rule stage, and a possible 30-day delayed

effectiveness period. This alternative was not acceptable because it would limit the Council's ability to respond to new information in a timely manner.

V.C Permit Fees

V.C.1 Proposed Action

The Magnuson Act allows the charging of fees for fishing permits, provided that the fees do not exceed the administrative costs incurred by issuing the permits. The Southwest Region, NMFS, would administer the permit program. This would involve maintaining a registry of permit holders as well as harvesting capacity unit holders and recording all changes as they occur. It also requires frequent meetings with permit holders, responding to inquiries about permits and transfer procedures, reviewing documentation, maintaining vessel files, and other activities. The level of application fee to be assessed is determined according to established Federal (NOAA, U.S. Department of Commerce) guidelines governing cost computation specific for activities associated with the permit product and services. The guidelines require in the computation direct labor costs of all NMFS personnel involved in the administration of the Western Pacific longline permit program including wages, compensation, cost-of-living adjustments, supplies and materials, postage, printing, etc. and indirect costs such as NOAA support, rent, etc. The cost for administering the issuance of permits under the Hawaii longline limited entry program is estimated to be between $40 to $50 per application.

V.C.2. Rejected Alternative: Charge no fees.

No fees are charged for other federal fishing permits in Hawaii, and the Council discussed whether the fee policy for longline permits should be consistent with the fee policy for other federal permits. The Council decided that it is appropriate for fishermen to cover basic permit issuance costs, provided that the fees are not unreasonably burdensome.

V.D. Other Proposed Changes

V.D.1. Require Limited Entry Permit Holders to Carry Only One Federal Permit

Hawaii longliners are currently required to carry two types of federal longline permit, general and limited, which has resulted in some confusion to fishermen and additional administrative workload for NMFS staff. To reduce this burden on fishermen and NMFS, the Council proposes that a single limited entry permit be issued to qualified Hawaii longliners which would allow them to fish either in the Hawaii fishery or in other areas under Council jurisdiction. For longliners not holding a Hawaii limited entry permit, a general permit would be required to fish within the EEZ of American Samoa, the Northern Mariana Islands, Guam and other US Pacific island possessions.

V.D.2. Allow US Longliners without Limited Entry Permits to Enter Hawaii Ports and EEZ

Currently, domestic longliners without Hawaii limited entry permits are not allowed to enter either the Hawaii EEZ or Hawaii ports with longline-caught fish onboard. Amendment 7 would amend the FMP allow domestic longline vessels that do not hold a Hawaii limited entry permit to enter the EEZ (but not fish) and enter Hawaii ports for provisions and repair, as long as no pelagic species are off-loaded. This change would provide US longliners the same access to Hawaii ports as is currently afforded foreign longliners.

V.D.3. Modify the list of species included as Pacific Pelagic Management Unit Species (PPMUS)

Several important species which are part of the harvest of pelagic fisheries are currently not included as PPMUS. Amendment 7 proposes to add the following species to the management unit:

Moonfish (opah)	*Lampris* spp.
Pomfret (manchong)	family Bramidae (pelagic species)
Oilfish (walu)	family Gempylidae

Moonfish, pomfret and oilfish would be considered to be recruitment overfished when their Spawning Potential Ratio (SPR) is equal to or less than 0.20. SPR is a ratio of the current reproductive capacity of the stock, or stock complex, to its unexploited capacity, over the entire range of the stock. A detailed description of the SPR definition and a discussion of various ways to measure SPR are found in Amendment 1 to the FMP.

V.D.4. Modify the Definition of Optimum Yield

The Council is concerned that the expansion of the longline fishery may potentially have adverse effects on certain stocks, on fisheries that are dependent on pelagic species availability in the EEZ around Hawaii, or on protected species. These impacts may occur even if the longline fishery occurs mostly outside the EEZ. Approximately 64% of the gear sets made by Hawaii limited entry longliners in 1992 occurred outside the EEZ. Accordingly, Amendment 7 proposes to amend the definition of OY to include the phrase "and adjacent waters to the extent regulated by this Fishery Management Plan". By making this change, the Council recognizes that OY should be defined to encompass the fishery beyond the EEZ. The amended definition reads as follows:

OY is the amount of each management unit species or species complex that can be harvested by domestic and foreign fishing vessels in the EEZ and adjacent waters to the extent regulated by the Fishery Management Plan without causing "local overfishing" or "economic overfishing" within the EEZ of each island area[1], and without causing or significantly contributing to "growth overfishing" or "recruitment overfishing" on a stock-wide basis.

V.E. Regulatory Measures Not Evaluated

There are regulatory tools, frequently employed by fishery managers, that were considered to be beyond the scope of this amendment. These are briefly described below.

V.E.1. Area and Season Closures

Area closures can be used to manage fishing effort in certain areas or at certain times for a variety of biological, economic, and social reasons. They can be established to prevent the excessive take of small fish, interactions with protected resources, or conflicts among gear types. Area closures (for example, sanctuaries and preserves where no fishing is allowed) are generally well understood by fishermen and can be relatively easy to enforce.

The current longline fishery management regime includes area closures to protect Hawaiian monk seals in the NWHI, and prevent conflicts between longline gear fishermen and troll and handline fishermen around the main Hawaiian Islands (MHI). The former closure is year-round and encompasses waters within approximately a 100-mile wide corridor around the NWHI (i.e., west of 160o W longitude). The area closure around the MHI is adjusted seasonally each year, with a somewhat smaller closure on the windward sides of most of the islands from October through January. While intended to prevent gear conflicts, the MHI closures also may reduce catch competition if fish that would have been caught on longline gear had the waters been open become available to and possibly catchable by other gear types. In addition, the MHI area closure also reduces the risk of interaction with protected species.

The FMP provides a framework process by which adjustments can be made in the area closures through a regulatory amendment to the FMP. Amendment 7 includes an alternative which would provide further improvements in the framework process so that area closures would be designated "established measures" which can be changed by notice rather than through a regulatory amendment (see Section V.C.4) after

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[1] "Island area" refers to American Samoa, Guam, Hawaii, the Northern Mariana Islands and other US Pacific Islands.

Council deliberation. In the scoping process for this amendment, the Council did not indicate any intent to review or revise the area closures now in place.

V.E.2. Catch Limitations (Quotas)

Quotas are a common type of fishery regulation designed to limit the amount of fish that can be taken from a stock (i.e., the output of a fishery). Fishermen are generally familiar with quotas systems. A quota could be set for total catch of all species in a fishery, the catch of a single species, the catch of a species by one or more gear types, or even the catch of species by sizes. Quotas are most commonly set for a given time period, such as a year or a fishing season. As a general rule, quotas are set to reflect a determination that a harvest of that amount is suitable given the condition of the stock involved, and would result in optimal benefits from the fishery considering the status of the stock and the social and economic variables relevant to the fishery.

Some types of quotas can result in erratic fisheries, with large catches early in the fishing season as participants race to take a maximum share before the overall quota is reached. This can lead to economic waste as fleets may be idled if the quota is taken before the end of the year and vessels have no alternate fisheries to pursue. Markets may be disrupted by the large early landings and small or nonexistent late season landings, and prices could fluctuate wildly as well. Management by quotas also requires a careful monitoring presence to determine actual landings and to deter landings after a quota is reached, especially if there are many places where fishermen can land their catch. Quotas are more likely to be effective in a single species fishery than a mixed species fishery. In a single species fishery, closure would not result in incidental catch and discard of bycatch. In a mixed species fishery, if a quota is set for one or more species which cannot be effectively targeted and avoided, then achievement of a quota for one species may result either in closure of the fishery and loss of value of other species taken with the quota species, or in discards and waste of catches made and discarded after the quota is reached.

Quotas have not been used in the western Pacific pelagics fisheries. The availability of pelagic fish tends to be highly variable, so there is considerable uncertainty concerning the condition of stocks. There is little evidence that setting quotas for the EEZ, either by species or area or gear type, would contribute to stock conservation or would result in improved economic and social conditions. Regulating catches in the EEZ is not likely to affect the status of the stocks, either in terms of maintaining their productivity or restoring the productivity of stocks that may be overfished on an ocean-wide basis. While there is evidence that eliminating heavy fishing by a given sector would result in better CPUE for other sectors, these effects are small for blue and striped marlin in Hawaii, and are not demonstrated for tuna. The potential economic impacts of such shifts are unclear. The Council did not include consideration of quotas in the scoping process for this amendment, and the impacts of quota alternatives are not evaluated.

Another variation is individual transferable quotas (ITQs). Under an ITQ system, each participant is assigned an ownership "share" of the total allowable catch (TAC) for a fishery. ITQs have been described as a possible adjustment mechanism (Sec. V.C.1). ITQs can help reduce or eliminate the "derby fishery" that often arises when a quota is set for a year with all participants trying to maximize their share of the quota in a first-come, first-served race. Markets can be more stable and there is less likelihood of quality problems, waste, and fishing under unsafe conditions.

There are, however, drawbacks to an ITQ system, especially early in the implementation phase, including difficulties in determining appropriate levels for TAC (as in any quota system), in determining the appropriate basis for assigning shares, and possibly in consolidation of quota share into very few hands. Use of ITQs has been included as a possible adjustment mechanism for use in the future. If adjustments become necessary, the feasibility and effectiveness of ITQs would be evaluated respective to other adjustment mechanisms.

V.E.3. Bycatch Limits

The harvest of bycatch can regulated for certain gear, area, and species combinations. For example, blue marlin: to many, the catch of blue marlin by longliners can be categorized as bycatch -- catch which is either discarded or of such minor relative value that requiring its release would not impose a significant burden. A bycatch allowance could be set that allows only a small portion of the total landings of a longline vessel operating around the MHI to consist of blue marlin. Generally, this would result in release of most, if not all, blue marlin which might subsequently be available to the sport and charter fishing sectors who value blue marlin highly. Vessel operators also could be advised about methods of longline fishing that result in lower rates of blue marlin catch. Bycatch allowances are, however, very difficult to monitor and enforce and, depending on the survival rate for released fish, the waste from discard mortality could be high.

V.E.4. Gear Restrictions

Gear restrictions can be used for a variety of purposes, but generally are intended as a means of limiting effective effort and, ultimately, the catch of fish or protected species. By defining the gear types covered by a management measure, the FMP defines those who will be managed. The FMP currently defines longline gear for purposes of the limited entry program as having a mainline of one mile or more in length. This effectively removes from the limited entry program persons who might deploy one or more "short" longlines and allows the use of short lines in areas around the main Hawaiian Islands otherwise closed to longline fishing. Gear restrictions can take the form of limits on the amount of gear used (e.g., length of mainline or number hooks per set) or how the gear is deployed (e.g., distance between longline floats so that hooks are set deeper or shallower or only during the day) or what gear is deployed (e.g., certain hook sizes or prohibition on no drift nets). Gear restrictions

could be set by fishery sector and could be limited to specific times or areas. The more detailed and specific the restriction, the greater the difficulty in monitoring and enforcing the measure, and the less likely it is to be effective in reducing fishery harvests.

Gear restrictions generally lead to inefficiency by individual vessels. Restrictions on one form of gear, or its use, often results in shifts to improved efficiency of other gears or technology to maintain catches at historic levels. Thus, gear restrictions may be a very inefficient way of regulating the effective harvest. Enforcement may also be difficult and costly.

Other than a comprehensive ban on drift gillnet fishing in the EEZ, there are few gear restrictions at this time in the pelagics fisheries, principally because they have not been viewed as likely to promote the achievement of FMP objectives. In the scoping process for this amendment, the Council did not indicate an intent to consider new objectives which might justify new gear restrictions. Therefore, this amendment does not evaluate the impacts of possible gear restrictions. The Council may consider such measures as part of its annual review under the FMP using the framework process proposed.

VI. IMPACT ASSESSMENT

VI.A. **Methods employed in impact assessment**

The evaluation of the impacts of the effort limitation alternatives employed a spreadsheet simulation model developed using logbook data to estimate resulting changes in location and magnitude of harvests.

VI.A.1 Development of spreadsheet simulation model.

The spreadsheet simulator was based on activity patterns during a 12-month period from October 1991 through September 1992. This period was chosen because, at the time the model was being developed, it included the most recent year's worth of information, for a time during which regulations were relatively constant. Catch and effort information from the federal logbook program was computed for three vessel size (length) categories: small (55 ft or less), medium (56 ft to 74 ft) and large (75 ft or greater). While it was recognized that vessel length may be an overly simplistic way to classify the fleet, these size categories were chosen because discussions with industry representatives indicated that, in general, each category represented different fishing capabilities and strategies. Small vessels are basically coastal vessels that are dependent on seasonally changing island-associated schools of yellowfin and bigeye tuna. Medium-sized boats can travel farther in search of available resources, including swordfish, when that resource moves closer to Hawaii during part of the year. Large vessels have a wider range of fishing opportunities and target swordfish heavily.

Information on fishing location, fishing effort, species and CPUE by vessel size category for the 12 month period was extracted from the federal logbook data base and used to construct the spreadsheet model. Total catch for selected species groups and species by area of fishing was then calculated using the estimated fleet by vessel size categories under various scenarios as input into the model.

The use of this simulation tool to evaluate the implication of various alternative permit transfer and vessel replacement rules is based on two assumptions: (1) the average CPUE values for a given size category vessel do not change with a change in number of active vessels, and (2) fishing strategies and activity patterns are assumed to be identical as those during the chosen 12-month period. That is, the model is static in that it is based on average fishing effort and species catch rates by area and by vessel category. Only the number of vessels by size category (the input to the model) is variable. The spreadsheet simulator does not have a category for vessels larger than those active during the moratorium. If, under this alternative, significantly larger vessels with different activity patterns (e.g., a large freezer-longliner) obtained a limited entry permit, then anticipated impacts could be greater. However, it was not possible to quantify such impacts at this time.

VI.A.2 Predicting changes in fleet size and composition under various scenarios.

The next step in the assessment process was to predict expected active fleet size and composition (proportion of small, medium and large vessels) which might occur under each regulatory alternative. The impact assessment developed for the draft amendment focused on four alternatives, all of which were ultimately rejected. However, the impacts of the proposed limited entry program are expected to fall within the range of these four alternatives.

The following predicted active fleet configurations were used to assess the impacts of the proposed limited entry program and five rejected alternatives:

For the continued moratorium alternative, the predicted fleet was based on the results of a Transferability Assessment Working Group meeting held on 12 November 1992. The longline industry members of the working group felt that if current regulations continued the active fleet would be expected to decline, especially the small boat segment. A number of the vessels in this size category were negatively impacted by the MHI area closures. Without the opportunity to upgrade fishing operations, marginal vessels were expected to leave the fishery. Industry representatives familiar with the medium-size vessels also predicted some decline in the active vessel if their ability to restructure corporations (to bring in new capital) is restricted by the one-time-only transfer rule. The one-time-only transfer rule also limits the number of potential buyers of marginal operations. If the new buyer is not successful, he or she does not have the option of reselling the permit with the vessel. The Working Group predicted a slight increase in the large vessels, based on several currently inactive swordfish vessels becoming active in the near future. The Working Group predicted that, under the continued moratorium, attrition in the active fleet would continue and a total active fleet of 106 vessels (15 small, 48 medium and 43 large) would result. This compares to an active fleet of 123 vessels (23 small, 60 medium and 40 large) in 1992.

For the limited entry alternative without restrictions (the original preferred alternative), the Working Group did not did not believe that all permits would become active, even with no restrictions on permit transfers or upgrading of vessel harvesting capacity. Scenario A represents their prediction that about 136 vessels would be active (16 small boats and 60 each of medium and large vessels). This scenario did not provide information on the maximum possible impact of this alternative. Therefore, a second scenario (B) with a maximum of 166 active vessels was also used with the spreadsheet simulator. For this scenario, the number of active small longliners (23) was assumed to remain the same as in 1992, but the remainder of the inactive vessels (43 in 1992) were allocated proportionally between the medium vessels (i.e., 86 medium vessels and 57 large vessels).

To assess the impacts of the dual permit alternative, the analysts assumed that the 166 "A" permits, eligible to fish either inside or outside the EEZ, would be active, as well as an additional 100 "B" permits (fishing outside the EEZ and landing in Hawaii). A level of additional effort of one hundred additional vessels was chosen because it equalled the increase in fleet size observed between the five-year period (1987-1991) before the moratorium took effect. These additional 100 vessels were divided among the medium (60) and large (40) categories. No additional small vessels were assumed since all fishing was required to take place outside the EEZ. Therefore, the total active fleet under the dual permit option was 266 vessels (23 small, 146 medium and 97 large vessels).

To analyze the impacts of allowing the current moratorium to lapse without any new effort limitation regulations in place, a tripling of the current active fleet was assumed for the open access alternative. Since the area closures would remain in effect, the number of small vessels was predicted to remain the same as in 1992 (23) while the active medium and large vessels would increase proportionally (208 and 138 vessels, respectively).

The limited entry program with a "harvesting capacity cap" alternative would have restricted fleet-wide harvesting capacity to the maximum allowed during the moratorium. Predicting the active fleet under this alternative is difficult because the rules for determining fleet-wide harvesting capacity and for allocating and transferring individual vessel harvesting capacity units were never developed. However, initial discussions focused on restricting vessel characteristics. Therefore, the size distribution of vessels associated with legal permits, i.e., 41 small, 71 medium, and 54 large vessels, was assumed to represent the active fleet for this alternative.

The limited entry program proposed under Amendment 7, differs from the Council's original preferred alternative in that the proposed limited entry program restricts vessel upgrades and permit transfers to the length of the longest vessel active in the fishery (93 feet to date). The active fleet was assumed to be the maximum which can be allowed (166 vessels), in the same size distribution as described under the no harvesting capacity restriction alternative, since the simulator model itself is limited to activity patterns of vessels no greater than the longest vessel active during the moratorium. That is, it was implicitly assumed that no owners would upgrade to a larger vessel than had been active in the moratorium.

Among the elements that can be manipulated to carry out a limited entry program, are the number of limited entry permits, the transferability of permits, the upgradeability of fishing capacity by the permit holders, and the differential application of limited entry to separate sectors of the fleet or in different areas. Before the Council narrowed its choice of alternatives, the preparers of Amendment 7 also ran the simulation model for active fleets predicted under 25 possible combinations of these elements. The results of this analysis are presented in Appendix 6.

VI.A.3 Estimating Predicted Changes in Longline Harvests

The actual 1992 active fleet, by size category, and estimates of active fleet size and composition under the proposed limited entry program and rejected alternatives, were then entered into the spreadsheet simulator and changes in expected harvest of pelagic species calculated. These results are summarized in Tables VI-1 and VI-2.

VI.B Predicted Fishery Impacts of Effort Limitation Alternatives

Each alternative is assessed with respect to expected changes in fishing effort, catch and revenue, and probable impacts on the stock-wide status and local availability. Table VI-3 summarizes the relative risks of each alternative with respect to potential problems of under-development, catch competition, market competition over-utilization and over-capitalization. A ranking of 1 indicates the lowest relative risk while a ranking of 5 represents the highest.

VI.B.1 Proposed Limited Entry Program

VI.B.1.a Expected Changes in Fishing Effort

The proposed limited entry program provides that limited entry permits will be issued to moratorium permit holders who either land longline caught fish at some time during the moratorium or meet certain exemption criteria. Since the moratorium does not expire until April 1994, the exact number of vessels that will qualify for permits and be active in the fishery is not known. However, the maximum number of longline boats that may be allowed to fish under Amendment 7 would be no more than the number of permits issued during the moratorium (166 to date). This number was used to estimate the impacts of the proposed limited entry program. A 32% increase in the total annual hooks was predicted. More effort would be expended both inside and outside the MHI EEZ, with the increase outside the EEZ being proportionately greater.

VI.B.1.b. Expected changes in catch and revenue

Landings of all species were expected to increase. Increases of 37% for all species and all areas was predicted. The largest estimated increase was for swordfish (41%). The increase was proportionately greater outside the EEZ (29%) than inside the MHI EEZ (9%). Total longline fleet revenue was estimated to increase from $43.7 million in 1992 to $60 million, assuming all permits are actively fished.

Table VI-1. **Active longline fleet used for each alternative to estimate changes in total effort (1,000 hooks) and catches (1,000lb).**

Vessels				
Management Alternative	Small (<56 ft)	Medium (56-74 ft)	Large (> 74 ft)	Total
Current (1992)[1]	23	60	40	123
Amendment 7 Limited Entry Program	23	86	57	166[2]
Harvesting Capacity Cap	41	71	54	166
LE w/out harvesting capacity restrictions[3]	16	60	60	136[4]
	23	86	57	166[5]
Current Moratorium	15	48	43	106
Dual Permits	23	146	97	266
Open Access	23	208	138	369

Estimated Total Effort Under Each Scenario (1,000 hooks)		
Management Alternative	Effort (1,000 hooks)	Percent Change
Current (1992)	11,700	
Amendment 7 Limited Entry Program	15,400	+32%
Harvesting Capacity Cap	16,300[6]	+39%
LE w/out harvesting capacity restrictions	12,600[2]	+7%
	15,400[3]	+32%
Current Moratorium	9,900	-15%
Dual Permits	23,500	+101%
Open Access	33,000	+182%

Estimated Total Catch and Percent Change from Current Situation				
Management Alternative	All Areas (1,000 lb)		MHI EEZ only (1,000 lb)	
Current (1992)	20,100		4,600	
Amendment 7 Limited Entry Program	27,500	+37%	6,000	+30%
Harvesting Capacity Cap	27,000	+34%	6,600	+44%
LE w/out harvesting capacity restrictions	23,900[2]	+19%	4,500	-2%
	27,500[3]	+37%	6,000	+30%
Dual Permits	46,800	+133%	6,000	+30%
Open Access	62,600	+211%	12,200	+165%

[1] Actual fleet active in 1992. Fleet information entered into simulator model to get simulated 1992 catch and effort. Simulated results closely approximated actual 1992 catch and effort information.

[2] Assumes all vessels active. Represents a maximum expected impact. If all permits not active, impacts would be less.

[3] Spreadsheet simulator based on activity of active vessels. If permit obtained for a significantly larger vessel with a different fishing pattern (e.g., a large freezer-longliner), then expected impacts might be greater under this alternative than estimated.

[4] Assumes Working Group active fleet prediction (136).

[5] Assumes maximum number of permits allowed will be active (166).

[6] Indicates the number of hooks predicted if all vessels permitted under the moratorium actively fished. The increase in effort is greater than the LE with no harvesting capacity restrictions because assumes same size distribution as under the moratorium. Therefore, there would be more small vessels than under the no restriction alternative. In 1992, small vessels deployed 116,001 hooks/vessel compared to 88,167 hooks/vessel and 92,353 for medium and large vessels, respectively.

Table VI-2. Impact of management options expressed as percent change from current landings.

MANAGEMENT OPTION	A PERMITS	TRANSFER-ABILITY	UP-GRADE	B PERMIT	ACTIVE PERMITS A/B S/M/L	CAPTURE LOCATION	MARLINS %	SWORD-FISH %	TUNA %
Amendment 7 limited entry	Yes	Yes, with restrictions[1]	Restricted[2]	No	166[3]/-- 23/86/57	Total[4] In[5]/Out[6]	28 25/33	41 39/58	32 25/37
Harvesting Capacity Cap	Yes	Yes, with restrictions	Restricted	No	166/-- 41/71/54	Total In/ Out	42 46/38	31 28/31	39 45/35
LE w/o harvesting capacity restrictions	Yes	Yes	Yes	No	136[7]/-- 16/60/60	Total In/Out	1 -812	27 9/29	8 -8/17
	Yes	Yes	Yes	No	166[8]/-- 23/86/57	Total In/Out	28 25/33	41 39/58	32 25/37
Continued Moratorium	Yes	No	No	No	106/-- 15/48/43	Total In/Out	-18 -23/-13	-5 -15/-4	-15 -23/-10
Dual Permits	Yes	Yes	Yes	Yes	166/100 23/146/97	Total In/Out	76 25/143	156 39/169	105 25/156
Open Access	Open	Open	Open	Open	369 23/208/138	Total In/Out	162 141/190	234 223/235	184 140/208

[1] Permits can only be transferred for use with vessels no longer than the length of the longest vessel active during the moratorium (93 feet to date).

[2] Vessels can be upgraded only to the length of the longest vessel active during the moratorium.

[3] Assumes that all current permit holders are eligible for new limited entry permit and all permits are active. If some permits inactive, then anticipated impacts would be less.

[4] Percent change from 1992 levels, for all areas combined.

[5] Percent change inside main Hawaiian island EEZ.

[6] Percent change outside the EEZ.

[7] Based on Working Group's prediction of 136 active vessels.

[8] Assumes all 166 permits issued are active. Spreadsheet simulator based on activity patterns of current vessels. If permit obtained for a significantly larger vessel with a different fishing pattern (e.g., large freezer-longliner), then expected impacts might be greater under this alternative than estimated.

Table VI-3. Relative risk[1] of under-development, catch competition, over-utilization, and over-capitalization caused by four alternatives.

Management Alternative	Under-Development	Catch Competition	Market Competition	Over-Utilization	Over-Capitalization
Amendment 7 Limited Entry Program	4	2	2	2	2
LE with Harvesting Capacity Cap	4	3	3	2	1
LE with Unrestricted Transfers/Upgrades	A[2]: 4 B: 4	A: 1 B: 2	A: 1 B: 2	A: 2 B: 2	A: 2 B: 2
Continued Moratorium	5	1	1	1	1
Dual Permits	2	3	3	4	4
Open Access	1	5	5	5	5

[1] Calculation of risks (ranked 1 to 5, with 1 lowest) was as follows: Under-development: % change in total tuna and swordfish catch; catch competition: 2 * % change in total tuna and marlin catch inside EEZ + % changes in tuna and marlin catches outside EEZ; market competition: 2 % changes in tuna catch inside EEZ + % changes in tuna catches outside EEZ; and over-utilization: % change in total swordfish and marlin catches; over-capitalization, based on catches: 2 * % change in tuna catch within the EEZ + % change in tuna catch outside the EEZ + 3 * change in total swordfish catch, or based on boats: 3 * A permit large boats + 2.5 * A permit medium + 0.5 * A permit small + 2* B permit large + 1.5 * B permit medium

[2] Based on Working Group estimate of 136 active vessels.

[3] Assumes all permits active (166 vessels).

VI.B.1.c. Probable stock impacts

The predicted levels of increased landings are more likely to have a measurable impact on swordfish than on tuna or other billfish species. Since landings are projected to increase, the relative likelihood of over-utilization must also increase. However, the relative risk of over-utilization for the proposed limited entry was low (risk factor 2) compared to the open access alternative (risk factor 5) or most of the rejected alternatives with a variable number of allowable permits (Appendix 6, Table 6-3). The projected increases in landing of tuna and marlin might technically increase the relative risk of over-utilization, but the impact on the stocks is not likely to be measurable or contribute significantly to over-utilization because the US proportion of the catch would still be 10% or less.

VI.B.1.d. Impacts on the locally available segment of the stocks

The potential for catch competition relative to current conditions would be expected to stay about the same. The relative likelihood of catch competition is a risk factor of 2. Thus, the risk of catch competition for the proposed limited entry program is low to moderate, compared to the range of risks for the entire set of alternatives considered by the Council.

VI.B.2. Limited entry with "harvesting capacity" cap

VI.B.2.a Expected Changes in Fishing Effort

This alternative would have the same eligibility criteria for obtaining a permit as the proposed limited entry program.. Therefore, an active fleet of 166 vessels was used to estimate impacts. A 39% increase in the total annual hooks was predicted. The increase in hooks deployed would be proportionately greater inside the MHI EEZ than outside, because there would be a larger number of small vessels that set more hooks fishing for tuna than larger vessels set fishing for swordfish..

VI.B.2.b. Expected changes in catch and revenue

Overall landings of all species from all areas would be expected to increase by 37%. For all areas, swordfish was predicted to increase by 31%, other billfish (marlins) by 42% and tunas by 39%. The largest increase in marlin catch was expected to occur within the MHI EEZ (46%), compared to 38% outside the EEZ. Total longline fleet ex-vessel revenue was estimated to increase from $43.7 million in 1992 to $58.7 million.

VI.B.2.c. Probable stock impacts

The predicted stock impacts under this alternative were the same as discussed for the proposed limited entry program.

VI.B.2.d. Impacts on the locally available segment of the stocks

The potential for catch competition relative to current conditions would be expected to increase under this alternative. The relative likelihood of catch competition is moderate (risk factor of 3) compared to the range of risks for the entire set of alternatives which were considered by the Council (Appendix 6, Table 6-3).

VI.B.3. Limited entry with no restrictions on permit transfers or vessel upgrades

VI.B.3.a Expected changes in fishing effort.

The maximum number of longline boats allowed to fish under this alternative would be 166, with the number of active vessel set at 136 and 166 for scenarios A and B to estimate the impact of the alternative. Under these scenarios, increases of 7% and 32% in the total annual hooks deployed was predicted. Under scenario A, 7% less effort was predicted to be expended within the MHI EEZ, commensurate with the decline in the number of active small boats compared to the "current situation". Under scenario B, more effort would be expended both inside and outside the MHI EEZ, with the increase outside the EEZ being proportionately greater.

VI.B.3.b Expected changes in catches and revenue

Landings of all species were expected to increase. Increases of 19% and 37% for all species and all areas were predicted for scenarios A and B, respectively. For both scenarios, the largest estimated increase was for swordfish (27% for scenario A, 41% for scenario B). For scenario A, the largest increase in swordfish catch occurred outside the MHI EEZ (29%) compared to 9% inside. For scenario B, a 58% increase in swordfish catch outside the EEZ was predicted, compared to 39% increase inside. Total longline fleet revenue was estimated to increase form $43.7 million in 1992 to $60 million for scenario B, (maximum number of active vessels).

VI.B.3.c. Probable stock impacts.

The predicted stock impacts under this alternative were the same as discussed for the proposed limited entry program.

VI.B.3.d. Impacts on the locally available segment of the stocks.

The potential for catch competition relative to current conditions would be expected to stay about the same under scenario A and increase for scenario B. The relative likelihood of catch competition are 1 and 2 for scenarios A and B, respectively. Thus, the risk of catch competition for this alternative ranges from low (for the fleet size predicted by Working Group) to moderate in the most extreme case, compared to the range of risks for the entire set of alternatives considered by the Council.

VI.B.4 Continued Moratorium Alternative

VI.B.4.a Expected Changes in Fishing Effort

If the moratorium continued in its present form, with no adjustments to permit transferability, the number of active vessels fishing would be expected to continue to decline by 14%, from 123 to 106 vessels. The annual number of hooks deployed is expected to decrease by 15%. Attrition is expected to cause a reduction in the number and proportion of small and medium sized vessels (from 23 to 15, and from 60 to 48, respectively) due to area closures and to the inability of these vessels to efficiently and safely fish distant grounds. Under this alternative, a permit holder cannot transfer the permit to a larger vessel with greater harvesting capacity. However, there is currently no restriction on modifying the original vessel in a way which would increase harvesting capacity. Only large vessels would be expected to increase proportionally from 39 to 43. The Working Group projected there would be such a small increase in large vessels because of the restriction on replacing vessels with increased harvesting capacity and allowing only one permit transfer. With this mixture of vessel size-classes, the proportion of vessels fishing offshore for swordfish and bigeye tuna would be expected to increase. Winter inshore bigeye tuna grounds would still be actively fished.

VI.B.4.b. Expected changes in catches and revenue

If the present moratorium continued, landings of all species and species categories would decline further from the current level. Landings of swordfish would remain the highest compared to other species, but would decline 5% overall (15% inside the MHI EEZ and 4% outside). Landings of marlins would be expected to decline 18% overall (23% within the MHI EEZ and 13% outside). Blue marlin catches would be expected to decline more than striped marlin catches because the large vessels target on swordfish and bigeye tuna in the winter when striped marlin are available and blue marlin are not. Total tuna landings would be expected to decline 15% overall and 23% within the MHI EEZ and 10% outside. Both yellowfin and bigeye landings would decline, but bigeye landings would decrease more than yellowfin both inshore and offshore. The species composition of the total catches would be expected to be: swordfish (25%), bigeye tuna (13%), yellowfin tuna (3%), and blue marlin (2%), and other species (45%). No significant changes would be expected in the average size of species landed. Bycatches would be expected to decline proportionally to total catches, thus blue shark bycatch and incidental takes of albatross and turtles in the swordfish fishery would decline the least. Total longline fleet revenue would decrease to $39 million from $43.7 million in 1992.

VI.B.4.c. Probable stock impacts

Given the size of the domestic fishery, the effect on the stocks would probably not be measurable. With the decline in fishing effort and landings by the Hawaii fleet, the

status of the stocks should improve if foreign mortality remains the same. The relative likelihood of over-utilization is the lowest among the alternatives considered (Table VI-3), but the risk of under-development is the greatest. For example, catch rates should go up, but probably not enough to be measured. Technically, the risk of over-utilization (growth overfishing) or recruitment overfishing would decline for all species. Since the decline in swordfish landings is expected to be small (5%), the domestic fishery would remain at or near its highest level of development and still comprise a significant portion of the total fishery on the species in the North Pacific. If it remains near the highest harvest levels, which would occur if other fisheries do not expand, then MSY will remain poorly estimated.

VI.B.4.d. Impacts on the locally-available segment of the stocks

With decreasing effort and catch, particularly within the EEZ of the main Hawaiian Islands, gear conflict would be expected to decrease. In addition, various aspects of fishery interaction (e.g. catch competition and market competition) should decline. Under this alternative, the likelihood of catch competition is the smallest.

VI.B.5 The Dual Permit Alternative

VI.B.5.a. Expected changes in fishing effort

Inside the EEZ, vessel participation would be expected to increase similar to the limited entry without harvesting capacity restrictions alternative, but outside the EEZ the model assumes that 100 additional vessels would participate for a total of 266 vessels (116% increase from 119). No small vessels were projected to enter the fishery outside the EEZ, and the number of medium and large vessels would increase 60 and 40, respectively. With the addition of these 100 vessels, allowed to fish only outside the EEZ, even more fishing effort would be distributed outside the EEZ than at present.

VI.B.5.b. Expected changes in catches and revenue

Landings resulting from fishing outside the EEZ would be expected to increase substantially, while landings from inside would be the same as without B permits (Table VI-1 and VI-2). Swordfish landings would increase 156% overall (169% outside the MHI EEZ, and 39% inside). Thus, the proportion of swordfish in the catch would increase substantially, and unless other swordfish fisheries in the central and eastern Pacific increased proportionally, the Hawaii fishery would almost certainly become the largest in the area. Tunas harvested outside the MHI would increase 156% while an overall increase of 105% would be expected (since predicted landings within the Main Hawaiian Islands EEZ would be the same as under the Council's preferred alternative). Landings of marlins would increase the least, but overall landings and landings outside the EEZ would be substantial (76 to 143%). Estimated total longline fleet revenue would be $102 million compared to $43.7 million in 1992.

VI.B.5.c. Probable stock impacts

The relative risk of under-utilizing the stocks under the dual permit alternative has a value of 2, compared to 1 for open access and 5 for the continued moratorium. That is, it has a relatively low risk of under-utilization. The relative risk of over-utilization of the resources is ranked at 4 compared to 1 for the continued moratorium and 5 for open access. Thus, the risk of over-utilization is relatively high. These high landings of swordfish will probably have a measurable impact on the stock. The relative risk of over-utilizing swordfish would be second highest among the alternatives (four times higher than for the continued moratorium). Whether the increased landings would cause MSY to be exceeded or (recruitment) overfishing to occur is unknown. The most recent assessment of the Atlantic fishery found swordfish to be more resilient to fishing pressure than previously believed. However, the need for effort limitation would be increased with the projected increases in fishing effort. While the increased landings of tunas and marlins would be sizeable, and the relative risk of over-exploitation is second highest, it is still not likely that the local fishery would significantly contribute to over-utilization or overfishing of the stocks. With an increase in the domestic share of the stock-wide harvest, however, catch rates might be expected to decline.

VI.B.5.d. Impacts on the locally-available segment of the stocks

The expected landings from within the EEZ for the dual permit option is the same as under the Council's preferred alternative. Therefore, catch competition effects due to fishing within the EEZ would be expected to be the same. However, catch competition might increase due to the substantial increases in fishing outside the EEZ by vessels holding B class permits. Thus, an overall relative risk of catch competition was estimated to be 3 (i.e., about a middle ranking).

VI.B.6. Under the Open Access Alternative

VI.B.6.a. Expected changes in fishing effort

The number of participating vessels was arbitrarily set at 369 by tripling the number active in 1992. The small vessels active remained the same while the medium vessels increased by about 245%. Effort would increase significantly both inside and outside the EEZ. A 182% increase in number of hooks deployed annually would be predicted.

VI.B.6.b. Expected changes in catches and revenue.

The landings from all species and species categories would be expected to increase considerably: swordfish 234%, tunas 184%, and marlins 162%. Proportionately swordfish would become even more dominant in the landings, and marlin would become less important. Bycatch would also be expected to increase considerably

from current levels, particularly in association with the swordfish fishery (more blue sharks, albatrosses and, turtles would be caught). The area closures in the Northwestern Hawaiian Islands would be expected to continue to preclude interaction with Hawaiian monk seals. Estimated total longline fleet revenue would be $136 million.

VI.B.6.c. Probable stock impacts

Under open access, the large increase in swordfish landings (234%), would be expected to produce a significant impact on the stocks. The probability of exceeding MSY and overfishing the stock would be at least 5 times greater than for the most conservative alternative. Even though the risk of recruitment overfishing would be greater (as with any increase in effort), it cannot be determined if it would be imminent. With the predicted large landings of tuna and marlins (much greater than under any limited entry alternative), the Hawaii fishery would no longer be an inconsequential part of the Pacific fishery. Impacts on the status of tuna and marlin stocks would most likely be measurable, including contributing to the continued over-utilization of blue marlin (unless catches by other foreign fisheries declined comparably to US increases).

VI.B.6.d. Impacts on locally-available segment of the stocks

With the open access alternative, the Hawaii fishery would increase its relative take of the total Pacific harvest. Hawaii fishermen would increasingly experience a decline in catch rates due to their own fishing, leading to catch competition. Catch competition between the longline fishery and the troll and handline fisheries would presumably increase, since the fishing power of a troll or handline boat is less than a longline vessel. Large increases in harvest from inside the EEZ suggests that fish would be removed faster than could be replaced through recruitment and immigration. This may result in local overfishing and catch competition. Of all alternatives, the relative risk of catch competition is greatest for open access.

VI.C Economic and Social Impacts of Effort Limitation Alternatives

The purpose of this section is to assist in understanding the relative economic consequences of alternative limited entry management actions by providing a qualitative evaluation of the limited entry alternatives identified in this amendment. Because of limitations on available information concerning the potential physical effects of the preferred action (and its alternatives) on fishing vessel performance and shoreside operations, a defensible quantitative approach is not possible.

The alternative management actions which were reviewed in the draft amendment contained three main components: 1) limits on entry into the Hawaii longline fishery, 2) various options for transferability of longline permits options, and (3) rules on vessel

upgrading. These measures were evaluated in terms of four theoretical longline fleet configurations.

As described previously, the four longline fisheries management alternatives which were discussed in the draft amendment were:

- Continued moratorium

  This alternative reduces the number of active longline fishing vessels by maintaining the current program of limited entry and restrictive permit transferability and upgrading rules.

- Limited entry without harvesting capacity restrictions

  This alternative fixes the number longline vessel permits at 166 but allows unlimited transferability of permits and upgrading of vessel capabilities.

- Dual permits

  This alternative allows for growth in the number of longline permits by allowing unrestricted permit transferability and upgrading for longliners with current permits and by allowing 100 additional permits for longliners to fish only outside the EEZ.

- Open access

  This alternative is designed to approximate the greatest range of open access possibilities, although it is not know whether this range would be reached or exceeded. The open access alternative assumes a fleet of 369, triple that of the current active fleet. This is designed to approximate a fleet which might become based in Hawaii if no effort limitation regulations are continued.

These alternatives specified a range of fleet size options to be analyzed. The proposed limited entry program differs from these in that it limits vessel upgrades to the size of the longest vessel active during the moratorium. As described earlier, the spreadsheet simulator was based on fishing patterns of active vessels. The impacts associated with the limited entry with no harvesting capacity restrictions alternative did not assume any vessels larger than the longest vessel active during the moratorium. Therefore, under the assumed active fleet, the economic impact of the new scenario is fundamentally the same as was estimated in the draft amendment for the limited entry without harvesting capacity restrictions alternative (previous preferred alternative). In this final amendment, this alternative has been replaced with the proposed limited entry program.

VI.C.1 Overview of Impact Assessment methodology

Table VI-4 presents the catch levels and estimated gross revenues used for the impact assessment. Also included is the estimated catch and revenue levels under the proposed limited entry program. The methodology behind the impact assessment is to identify some key causal relationships between the number of active longliners and their associated catch levels (as identified above), as well as potential economic effects. Figure VI-1 outlines this methodology.

The following section discusses each of seven key economic impact categories in some detail. However, it is important to realize that in many cases the relative quantification of the causal relationships is largely conjectural. Their basic parameters should be probed for resiliency before too much weight is placed on the projected impacts.

Two central effects considered important by the trollers and handliners are catch competition and market competition. In neither case is the causal relationship confidently modeled in a quantitative sense. However, using "worst case" scenarios, expanding longliner access may have a substantial cost to these types of vessels in both the catch and market competition impacts. It is important to realize that the scale of these effects must be considered subjective until more is known about the physical and economic relationships involved in these competing fisheries.[1]

Finally, the economic costs of the risk of over-fishing swordfish are also projected, although there is essentially no biological information on which to base the risk projections except for the experience of the Atlantic swordfish fishery.[2]

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[1] Although these effects would be "additive" in a qualitative sense, the extent of this additivity is not know quantitatively. This is particularly true since the strongest quantitative relationships between catch and catch rate, and landings and sales price, are within the troll/handline segment of the pelagic fishery.

[2] Presumably these effects would also be additive, but they are not evaluated due to the lack of quantitative information (including simulation).

Table VI-4. Estimated Catch and Gross Revenue under Effort Limitation Alternatives

Current Situation	Catch (1,000 lb)		Gross Revenue ($1,000)	
	All Areas	MHI	All Areas	MHI
Longline	20,100	4,600	$43,700	$10,000
Troll/Handline	5,000	5,000	$7,700	$7,700
Management Alternative	**Longline Catch (1,000lb)**		**Longline Gross Revenue ($1,000)**	
	All Areas	MHI	All Areas	MHI
Amendment 7 Limited Entry	27,500	6,000	$60,000	$13,000
Continued Moratorium	18,000	3,700	$39,000	$8,000
LE without Harvesting Capacity Restrictions[1]	27,500	6,000	$60,000	$13,000
Dual Permits	46,800	6,000	$102,000	$13,000
Open Access	62,600	12,200	$136,000	$26,500

The spreadsheet simulator assumes no vessel greater than those active during the moratorium. Therefore, if a significantly larger vessel with a different activity pattern (e.g., a larger freezer-longliner), were to become active under this scenario, then impacts might be greater than those described.

Figure VI-1: Causal relationships in the impact assessment

Regulatory alternative ====>

Estimated number and location of longline fishing vessels

====> Predicted change in total longline catch and catch composition

====> Estimated physical change in related activities

(for example, troll/handline catch rates)

====> Estimated economic costs or benefits (change in income) of individual effects

(for example, change in troll/handline operator incomes)

====> Fleet segment change in economic values

(for example, change in total troll/handline fleet income)

=====> Relative ranking of regulatory alternatives

VI.C.2. Potential economic and social effects

Regulatory impact analysis usually presumes a long-term perspective where costs are allocated over time, and discounted appropriately. However, conducting such analysis, accounting for both time and sensitivity of the results to variation in parameters, would imply that the estimates in this section have greater confidence than they do. These estimates should be viewed purely as indicative of the scale of impacts possible under the moratorium and as a source for discussing and evaluating qualitatively the impact of the proposed measures.

There are a number of potential economic effects which might be caused by the proposed limited entry alternatives, and their effects may vary in the short- and long-term by the extent to which fishing vessels excluded from the Hawaii longline fishery can find alternatives. Seven types of fishing vessels are potentially affected by these management measures (Table VI-5). The number of all fishing vessels which might be excluded from the fishery cannot be computed, but identification of the types of potentially-excluded fishing vessels may make evaluation of the potential impact of limited entry alternatives easier.

The potential economic effect of the longline moratorium is discussed below with as much quantitative "simulation" as possible. However, it must be stressed that these "simulations" are not based on a current statistical data base.

A central issue in the initial moratorium was whether non-grandfathered longline vessels would be excluded just from the EEZ, (i.e., the dual permit option), or whether they would be excluded from operating from Hawaii entirely. This issue is integrally linked to the enforceability of such area restrictions and is not addressed in this analysis per se. (However dual permits are considered throughout the analysis).

The following are seven possible effects of various limited entry alternatives:

1. Income of longline fishing vessels.
2. Catch rates (catch per unit effort).
3. Gear conflicts.
4. Market competition.
5. Seafood market volume and income.
6. Shoreside provisioning and infrastructure.
7. Risk of over-fishing.

Table VI-5. Types of fishing vessels potentially affected by longline limited entry (number in parenthesis is a *rough estimate* of the number of vessels in each category)

1. Included Hawaii longline fishing vessels (currently permitted under moratorium) (166)

2. Excluded Hawaii longline fishing vessels (excluded by original moratorium) (20)

3. Hawaii trollers and handline fishing vessels, full-time equivalent number (475 commercial, of which 75 are full-time charter boats, and 200 frequently active recreational fishing boats).[3]

4. Excluded Hawaii fishing vessels (e.g., small-scale vessels which might have outfitted for short-set longliners, bottomfish, lobster, and albacore fishing vessels which might have outfitted for longline fishing) (25)[4]

5. Excluded US mainland longline fishing vessels (50)[5]

6. Excluded US mainland non-longline fishing vessels (number unknown)

7. Potential fishing vessels, i.e., those subject to investment (number unknown)

---

[3] The number of commercial troll/handline vessels is estimated by dividing estimated total landings for 1990 by average catch per vessel from the cost earnings statement which used current average catch per trip, and the full-time equivalent number of trips per year.

[4] Excluded Hawaii non-longline vessels are calculated as 5% of the small boat fleet.

[5] Excluded mainland longline vessels are calculated as 10% of Atlantic longline permit holders.

The following discusses each of these effects in detail. Figures VI-2 through VI-8 outline each effect. The basic framework for the analysis is a cost-earnings approach to modeling the economic returns to individual vessels, amplified by the number of vessels in each fleet segment (Pooley 1991).

The cost-earnings statements used in the impact assessment are derived from spreadsheet models following the basic methodology outlined in Clarke and Pooley (1988). These cost-earning statements are summarized in Tables VI-6 and VI-7.

Basically, the cost-earnings statements consist of two components: the income statement which summarizes annualized fixed and operating costs, and the operating characteristics which present basic information on vessel operating rates, e.g., number of days fishing, percentage of revenue used to calculate handling costs, etc. The operating characteristics section also summarizes some components from the income statement. The longline cost-earnings statement is based on the cost of operations of a Class II NWHI lobster fishing vessel (Clarke and Pooley 1988), modified to adjust some cost categories and to calculate revenue based on longline fishing characteristics and updated to 1992 price levels. The troll/handline cost-earnings statement is based on several research studies of trolling and handline fishing vessels in Hawaii, with the basic methodology outlined in Pooley (1986).

Longline catch (234,000 lb) is calculated as number of fishing days (134) times catch per day (1,747 lb). Catch per day is calculated as the number of hooks per day (1,015) time CPUE (1.34 lb per hook). Troll/handline catch (23,465) is calculated as number of trips per year (150) times catch per day (156.43 lb of pelagic species).

Capital costs (for both longline and troll/handline) is calculated as an amortized rate of investment at the capital factor rate (11.03%). The annul repair costs are calculated as a maximum of actual average costs and an annual depreciation of investment, at a 6.67% rate. Handling costs area calculated as a percentage of total revenue, as identified in the operating characteristics sections of Tables VI-6 and VI-7. Labor income is the sum of crew share plus captain's bonus

The inflation factor updates costs prices from 1990 to 1992 price levels using the 1990 and 1992 Honolulu consumer price index (HCPI). The inflation factors differ between the longline and troll/handline cases because of different base years for the analysis.

The impact assessment analysis examines both the gross (ex-vessel) revenue of the affected vessels and their total income, which is calculated as the sum of the net revenue (profit) and labor share. In most cost-benefit analyses, the change in net revenue is considered to be the most appropriate means of comparing costs and benefits, but gross revenue is presented here because it is well known to the fishing public. Total income is used instead of net revenue to reflect the supplemental income effect in an economy that is not at full employment.

Figure VI-2. Loss of income for excluded longline fishing vessels

Continued moratorium ===> lost fishing opportunities

for a variable number of currently permitted but inactive longliners

&

for 100 mainland longliners

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Continued moratorium ===> cost of moving vessels back to mainland US fisheries

for a variable number of currently permitted but inactive longliners

==========

Amendment 7 Limited Entry Program ===> lost fishing opportunities

for 100 mainland longliners

Figure VI-3 Change in catch rates (catch per unit effort)

Main Hawaiian Islands EEZ effect only

Continued moratorium ===>

decline in MHI longline catch levels

{impact of permit transferability restrictions}

===> potential increase in troll/handline catch rates

===> potential increase in catch rates for remaining longliners

==========

Amendment 7 limited entry program, dual permits and open access ===>

increase in MHI longline catch levels

===> potential decrease in troll/handline catch rates

===> potential decrease in catch rates for current longliners

Figure VI-4. Reduced gear conflicts

Amendment 7 limited entry program, dual permits and open access ===>

increased MHI longline fishing activity

===> potential increase in interference with troll/handline fishing activity

Swordfish dual permit options ===>

increase swordfish activity in limited areas

====> potential increase in **intra**-longline gear conflicts

****

Figure VI-5. Market competition

Continued moratorium ===>

Continued reduction in longline tuna fishing effort

===> Potential reduction in competition with troll/handline tuna

===> Potentially higher tuna prices to troll/handline vessels operators

Amendment 7 limited entry program, dual permits and open access ===>

===> Potential increase in competition with troll/handline tuna

===> Potentially lower tuna prices to troll/handline vessel operators

Figure VI-6. Hawaii seafood volume

Continued moratorium ===>

Continued reduction in longline tuna fishing effort

===> Potential reduction in availability of high-value tuna for local consumption and export

===> Decreased income for local wholesalers

===> Increased fresh tuna prices for local consumers

Amendment 7 limited entry program, dual permits and open access ===>

===> Likely increase in availability of high-value tuna for local consumption and export

===> Increased income for local wholesalers

===> Continued increase in swordfish landings

===> Increased income and employment for local wholesalers and brokers

Figure VI-7. Shoreside provisioning

Volume of services

Continued moratorium ===>

Reduction in fleet size

===> Reduction in volume of

--- fleet repair {shipyard, etc.}

--- provisioning {fuel and oil, ice, supplies, etc.}

===> Potential decrease in waiting time for some services

{for example, annual haul-out}

===> Potential increase in some costs to all segments of pelagic fleet

{for example, loss of ice machine or increased charge due to sub-optimal operating levels}

Amendment 7 limited entry program, dual permits and open access ===>

Increased fleet size

===> Increased volume of fleet repair and provisioning

===> Potential delays in obtaining some services {for example, annual haul-out}

Figure VI-7: Shoreside provisioning (continued)

Dockside logistics

Continued moratorium ===>

Reduction in fleet size

====> reduced off-loading & re-supply problems dockside

Amendment 7 limited entry program, flexible permits and open access ===>

Increase in fleet size

====> off-loading & re-supply problems dockside

--- too many boats for existing harbors

{evaluated as increased time spent loading and off-loading per trip}

Figure V-8: Risk of Overfishing

Swordfish

Continued moratorium ===>

No increase in risk

Amendment 7 limited entry program, dual permits and open access ===>

Potential risk of over-fishing
{Hawaii landings large percentage of total Pacific-wide catch}

===> lost income to existing and new longliners

===> possible shift of fishing into tuna

===> potential impact on MHI EEZ fisheries

==========

Tuna and other pelagics

{Hawaii landings are small percentage of Pacific-wide total, thus limited or no risk of Hawaii fishery leading to over-fishing for these species}

Table VI-6: Hawaii longline cost-earnings statement (updated to 1992) average, annualized, full-year operations

Income Statement	Mid-sized Hawaii Longliner[6]	
Revenue		$519,000
Fixed Costs		$206,400
Capital	$75,800	
Annual Repair	$24,500	
Vessel Insurance	$47,400	
Administrative	$26,700	
Other	$32,000	
Operating Costs		$364,493
Fuel & Oil	$54,300	
Bait	$64,200	
Ice	$23,700	
Handling	$38,793	
Provisions	$19,100	
Gear and Supplies	$39,600	
Other	$6,600	
Crew income	$109,100	
Captain's Bonus	$9,100	
Total Cost		$570,893
Net Revenue		$- 51,893

Operating Characteristics (next page)

[6] Costs of operations for a longline vessel was modeled using a Class II NWHI lobster vessel as a prototype (Clarke and Pooley 1988)

Table VI-6(cont). Updated to 1992 costs and operations, 1987-90 hypothetical, annualized (full-time operations)

Operating Characteristics (Weighted average)

Investment			$500,000
Trips	15		
Catch per day	1,747		
Trip Days	224		
Fishing Days	134		
Turn-around days	90		
Shipyard, etc	51		
Total Days	365		
Shared Operating Costs			$246,293
Crew share	40.0	%	
Crew	6.00		
Labor income			$188,200
Total income			$66,307
Return on Investment	-10.38	%	
Handling rate	7.47	%	
Revenue			$519,000
Product Price per pound	$2.23		
Total Catch	234,000		
Total Hooks	135,439		
Capital factor	11.03	%	
Depreciation factor	6.67	%	
Inflation factor (1992 to 1990)	1.19		

Table VI-7: Hawaii small-scale troll/handline cost-earnings statement
Updated to 1992 costs and operations.
Annualized (full-time operations) 1987-1990 hypothetical

Income Statement	Small-scale troll-handline	
Revenue		$39,378
Fixed Costs		$18,000
Capital	$9,600	
Annual Repair	$3,900	
Vessel Insurance	$2,900	
Administrative	$1,600	
Other	0	
Operating Costs		$32,228
Fuel & Oil	$10,100	
Bait	$3,600	
Ice	$2,800	
Handling	$3,938	
Provisions	$2,200	
Supplies	$5,300	
Other	0	
Crew income	$3,432	
Owner-operator income	$858	
Total Cost		$ 50,228
Net Revenue		$ -10,850

Operating Characteristics (next page)

Table VI-7 (cont). Operating Characteristics (Weighted average)

Investment			$58,143
Trips	150		
Catch per day	156.43		
Trip Days	150		
Fishing Days	150		
Turn-around Days	150		
Total Days	300		
Shared Operating Costs			$27,938
Gross revenue (ex-vessel)			$39,378
Crew share	30.0	%	
Crew	2.00		
Labor income			$ 4,290
Total income			$-6,560
Return on Investment	-18.66	%	
Handling rate	10.00	%	
Revenue			$39,378
Product Price per pound	$1.68		
Total Catch (lb)	23,465		
Capital factor	11.03	%	
Depreciation factor	6.67	%	
Inflation factor	1.50		
Fuel price factor	1.28		

As discussed previously although the results in this section are calculated *quantitatively*, the overall assessment of the effects should be *qualitative* because of the weakness of the information on which these effects are being analyzed.[7]

VI.C.2.a. Income of longline fishing vessels.

There are two types of costs and benefits likely to accrue to the longline segment of the Hawaii pelagic fishery due to the proposed regulatory alternatives: increased income (or at least augmented income) to longline vessels included in the Hawaii fishery, and lost income to the longline vessels excluded from the Hawaii fishery. The increment in longline industry revenue in the four regulatory alternatives can be calculated from Table VI-4, but the existing economic analysis of the profitability of individual longline fishing vessel suggests that the average Hawaii longliner is failing to make an economic profit, although it is covering operating costs (Table VI-6). It is likely that loosening permit transferability or upgrading restrictions would reduce the average costs of operations for Hawaii longline vessels, either as permit holders invest in improvements to existing longline vessels or as inefficient operations sell their permits to more efficient operators and leave the fishery. Unfortunately, too little is known about the range of operating economics of the whole Hawaii longline fleet to make estimates of these improvements. The collection of such information is part of the research needs identified in Appendix 2.

In terms of the loss of income for excluded Hawaii longliners, at the time of the initial moratorium, the impact assessment argued that the 30 *excluded* longline vessels already resident in Hawaii would incur substantial relocation costs if the moratorium were implemented. Those are now sunk costs and should not be considered in this amendment. However there are also 43 inactive, but permitted, longline vessels in Hawaii. These vessels may be inactive because of the permit transferability restrictions involved in the current moratorium or because of other factors. If the moratorium is extended, they would then incur relocation costs to other fisheries (along the same lines as argued in the impact assessment for the current moratorium). These costs amount to approximately $75,000 per vessel on a one-time basis.

It is still the case that fishing vessels in Hawaii and from the mainland US were entering the Hawaii longline fishery at dramatic rates in the late 1980s before the moratorium. As mentioned earlier, it is assumed that there would be as many as 200 additional longline vessels in the fishery without a moratorium or limited entry.

In the open access alternative, these vessels will be able to join the Hawaii longline fleet and generate incomes in Hawaii. With the Amendment 7 limited entry program or a continued moratorium, they will not be allowed to enter the Hawaii fishery, but they will be able to continue in whatever fishery they are currently in. East and Gulf

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[7] The calculations used to make the individual estimates are contained in a Supercalc 5.0 spreadsheet, RIR3z.cal (10 October 93) maintained by Sam Pooley, Honolulu Laboratory.

Coast longliners may have been entering the Hawaii fishery because of better fishing conditions in Hawaii, and the exclusion of these vessels would mean they have lost an opportunity for income. However, a simple comparison of average catch rates for Atlantic coast yellowfin longliners (Prager and Browder 1992) with Hawaii tuna longline catch rates (Dollar 1992) suggests that the differences in catch rates are not the only reason longliners came to Hawaii. Therefore, no opportunity costs are estimated for this analysis.

VI.C.2.b. Catch rates (CPUE).

As pointed out in the original impact assessment (Pooley, unpubl.) and in other parts of this amendment, no statistically valid relationship between catch rates and expanded longline catch and catch rates in the longline fishery or other fisheries has been identified. Similarly, there is no evidence of catch competition within the longline fishery, although experience in the Atlantic suggests that substantial increases in fishing effort may diminish longline catch rates (or size of fish) in the long-run (Berkeley 1989). The impact of increased longline catch on the catch rates of the originally permitted longline vessels, using the methodology discussed below for the longline and troll/handline catch competition analysis (extension of Pooley and Yoshimoto 1991), is positive but statistically insignificant (i.e., increasing longline catch leads to increasing longline catch rates)[8]. Therefore for this impact assessment, the impact of increasing the size of the longline fleet through the restricted entry or open access alternatives is judged to be zero.

Pooley and Yoshimoto (1991) examined the available information on catch competition between the longline and troll/handline fleets using a four-year sample of monthly landings from the two fleets. Extending that analysis for the initial and for the current RIR, no statistically-valid relationship could be found between longline catch and troll/handline catch rates[9]. The statistically-insignificant relationship indicated that a 100% increase in MHI longline tuna catch per month would lead to a 5.6% decrease in troll/handline catch rates. For example, increasing MHI longline tuna landing by 100,000lb (a 50% increase over the sample period) would reduce Oahu total catch per trip by 4.4. pounds (from a sample average of 155.6 lb). A stronger relationship may exist, but it may be shielded by natural variability in the pelagics fisheries and by the short time-series of detailed information available for the Hawaii analysis.

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[8] The impact is statistically insignificant, with the coefficient on the trips variable being positive; presumably an unexamined influence, such as changes in the composition of the longline fleet during the three year period or unidentified seasonal and annual variability in the catchability of pelagics, "explains" this anomaly.

[9] The "strongest" relationship was between Oahu troll catch per trip (CPT) and longline tuna catch, but only 5/10 of 1 percent of the total variation in Oahu CPT was "explained" statistically. The t-statistic is insignificant at the 90% confidence level. (S. Pooley, NMFS Honolulu Laboratory, personal communication, 1993).

The potential impact of an extended moratorium or a limited entry program on catch rates for the remaining longline and troll/handline fishing vessels depends on both the potential number of excluded longliners and where the excluded longliners would have fished. The three basic scenarios in this amendment and the two major alternative locations in which they could fish (inside and outside the main Hawaiian islands EEZ) would mean different effects of the amendment. For the purposes of this section, it will be assumed that only changes in longline catch inside the MHI EEZ might affect troll and handline catch rates, and the distribution of fishing effort will parallel that identified in the Longline Permit Transferability Workshop. The chance that an alternative distribution of fishing effort (i.e., substantially more fishing within the MHI EEZ) might occur is considered under the risk of over-fishing swordfish stocks.

Table VI-8 indicates the simulated relationship (using the relationship described above) between longline tuna landings and Oahu troll/handline catch under the four alternatives.

Under the continued moratorium alternative there would be continued attrition in the fleet, with total longline tuna catch declining by 15% overall, and 23.5% in the MHI EEZ (compared to the current situation). The loss to the longline fleet was considered in the previous section. The benefit to the troll and handline fleet would accrue from increased catch rates due to less catch competition. The troll/handline catch rate would be 158.3 lb/trip (compared to 156.4 in the simulated current situation), with an increase in annual income (net revenue and labor share) per vessel of $417 and an increase in annual ex-vessel revenue of $463 per vessel[10].

The Amendment 7 limited entry program would involve a 25% increase in tuna landings from the MHI EEZ. The decreased troll/handline catch rate would be 154.4 pounds per trip, with a decrease in annual income (net revenue and labor share) per vessel of $451 and a decrease in annual ex-vessel revenue of $501 per vessel.

The dual permits and open access alternative would have similar, but proportionally larger, effects. These are summarized in Table VI-9.

The impact on recreational fishing is unpredictable because no clear relationship has been established between catch rates and the recreational experience. However, Meyer (1987) has shown the hedonic value of recreational fishing to be substantial in Hawaii. For this impact assessment, the potential cost to recreational fishing is considered roughly equivalent to the impact on the small-scale commercial troll/handline impact just evaluated. However, particular effects may exist for some recreational segments, e.g., the Kailua-Kona charterboats and their patrons fish for blue marlin.

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[10] Recalling the definitions of gross revenue and total income discussed earlier.

Table VI-8. Simulated Relationship[11] Between Monthly MHI Longline Tuna Catch and Oahu Troll/handline Catch Per Trip

Scenario	Estimated Monthly MHI Longline Catch (Pounds)	Projected Troll/handline Catch Per Trip (CPT)	
		CPT (lb)	% Change
Current Situation	179,500	156.4	
Continued Moratorium	137,583	158.3	1.2%
Amendment 7 Limited Entry Program	224,667	154.4	-1.3%
Dual Permits	224,667	154.4	-1.3%
Open Access	438,000	145.1	-7.3%

Table VI-9 Change in annual gross (ex-vessel) revenue and total income per vessel for full-time commercial troll/handline fishing boats due to changes in MHI longline tuna catch. ((+) represents increase while (-) represents a decrease)

	Gross Revenue	Total Income
Continued moratorium	+ 463	+ 417
Amendment 7 limited entry program	-501	- 451
Dual Permits	- 501	- 451
Open access	- 2,865	- 2,578

[11] Oahu Total CPT = Constant +/- B * longline tuna catch, where the constant equals 164.325 and B equals -0.000044.

VI.C.2.c. Gear conflict.

The passage of Amendment 5 eliminated most, if not all, of the gear conflicts between longline and troll/handline fishing vessels. The open access alternative, by potentially tripling the longline fleet size, might lead to gear conflicts either amongst longliners themselves or even with some troll/handline vessels (if more longliners chose to fish near the MHI area closures). There is no quantitative information on the impact of these gear conflicts on trollers and handliners, or between longliners. However, for purposes of evaluation, it is assumed that one day of fishing per commercial troll/handline vessel affected would be lost every month due to gear conflicts in the case of open access (with a potential tripling of the total active longline fleet operating in the EEZ). The cost per troll/handline vessel in recovery of lost fishing time is about $3,150 in gross revenue and $343 in net income per year. However, since the overwhelming majority of small-boat fishermen fish within 20 miles of shore and longliners are prohibited from fishing within 75-50 miles from shore most of the year, few troll/handline fishermen would be expected to be impacted. The greatest risk of increased gear conflict would be due to undetected illegal fishing. No impact is estimated for the growth in the active longline fleet other alternatives since the fleet allowed to fish inside the MHI would be fixed at 166 vessels or less.

Other permit combinations, (such as dual permits with relatively open access for "B" permits) might cause conflict on the swordfish grounds whenever swordfish are not abundant. This is evaluated as losing one day per month to such gear conflicts[12]. This amounts to $4,300 per vessel in lost income per year.

VI.C.2.d. Market competition

Many local commercial trollers and handliners believe there has been a substantial reduction in their market price due to increased longline catches. This effect is not clearly identifiable using annual data for 1980-92. Furthermore, there is a strong argument by people in the Hawaii seafood market sector that the market segments served by the longline and troll/handline vessels are substantially different. However, changes in species composition and intra-monthly factors may be masking the impact.[13] Nonetheless, since most of the increased longline catch has been exported to the mainland USA and to Japan, it is not surprising that evidence of a price effect is not easily determined. Study of this issue was proposed as part of the three-year research plan of the Pelagic Plan Team (Appendix 2).

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[12] Calculated as adding 0.8 at-sea days per trip.

[13] For example, Pooley (1987) found a strong weekly effect in bottomfish landings and prices where a monthly and annual effect was minimal.

In preparing the previous impact assessment, Pooley (unpubl.) found a small (although still statistically insignificant) effect for all species combined (instead of just yellowfin tuna): an 18% decrease in fishing effort and catch by the longline vessels excluded by the moratorium could increase market price by 1% for troller and handliners. The impact of such competition on Hawaii's pelagic fish consumers is unknown.

Under the Amendment 7 limited entry program, troll handline prices would decrease 1.7% due to increases in overall longline landings. Under the Dual permits alternative, troll/handline prices would decrease by 1.7%. Under the Open Access (tripled active fleet) alternative, troll/handline prices would decreased by 9.2% The losses in annual total income (labor share plus net revenue) per year for commercial troll/handline boats are identified below.

	Annual loss in Total Income per commercial troll/handline vessel
Amendment 7 Limited Entry Program	$1,123
Dual Permits	$1,123
Open Access	$2,169

The impact on consumers, in terms of availability of fresh fish and higher prices, is unpredictable because a) retail mark-ups are not known, b) substantial volumes of the longline caught fish are "exported" to markets (i.e., the US east coast) where there is sufficient competition to make the impact of the Hawaii component uncertain, and c) imported fresh pelagic fish seems to be increasingly available on a world scale.

Thunberg and Seale (1992) developed an empirical model of swordfish demand and supply on the east coast of the US. Their research timeframe (1984-1990 monthly data, 1978-1990 quarterly data) pre-dated the development of the Hawaii swordfish fishery, but does contain some useful information on the swordfish market. Thunberg and Seale found that the price elasticity of demand for swordfish was -0.85, meaning that a 1% increase in the swordfish prices would decrease consumer demand by 0.85%. Furthermore, there was a strong seasonal effect, with demand for swordfish being strongest from July through December. Finally, the price flexibility of supply was found to be -0.93, meaning that a 1% increase in supply would decrease price received by 0.93%. This suggests that further development of the Hawaii swordfish fishery would have to be tempered by the impact of competition with the Atlantic fishery.

VI.C.2.e. Seafood market volume and revenue

The greatest change in Hawaii seafood market volume and revenue since the initial moratorium has been a change in the species and gear composition of pelagic landings. In particular, the availability of high-value yellowfin and bigeye tuna has declined.[14] The Continued Moratorium would be expected to continue this trend, with tuna landings diminishing by 15% and total landings by 10%. This would reduce income to the seafood market sector (wholesalers, retailers, brokers, etc.) by reducing their volume (adding to per unit fixed costs) and by reducing labor income for handling and processing pelagic product[15].

The seafood market revenue and income impacts are summarized below:

	Annual Gross Revenue -- Seafood markets[16]	
	$million	
	Tuna	Total
Current Situation	30	54
Continued Moratorium	25	49
Amendment 7 Limited Entry Program	40	74
Dual Permits	62	125
Open Access	85	167

[14] Longline landings of bigeye and yellowfin tuna decreased by 12% from 1990 to 1992. Inflation-adjusted longline revenue, excluding swordfish, peaked in 1989 at $25.3 million (1992 $), falling to $20.5 million in 1992. Bigeye tuna revenue, however, has remained essentially stable from 1989 to the present.

[15] Although the final value added through the wholesaling, processing, and retailing process is not clearly known, value-added is calculated as 20% of the ex-vessel revenue for this analysis. Cooper and Pooley (1983) found wholesale mark-up on fresh product in the Hawaii market as 9% on volume, and Higuchi and Pooley (1985) found retail mark-up as 10% on volume. Value-added income is estimated at 10% of the total mark-up. This is a purely hypothetical figure.

[16] Estimated as 20% more than ex-vessel gross revenue.

	Annual Mark-up Income -- Seafood markets[17]	
	Tuna ($1000)	Total ($1000)
Current Situation	500	900
Continued Moratorium	400	800
Amendment 7 Limited Entry Program	660	1,200
Dual Permits	1,000	2,100
Open Access	1,400	2,800

VI.C.2.f. Shoreside provisioning and infrastructure

The same kind of impacts would be felt on shoreside provisioning (supplying fuel and oil, equipment, bait, provisions, etc., as well as shipyard services). If we view this as the annual cost of repairs and operating expenses for a longline fishing vessel, then various Hawaii suppliers would lose income for every longline vessel excluded form the fishery[18]. The estimated value-added income for each scenario is presented below[19]:

$1,000 in value-added income to Hawaii suppliers[20]

Current situation	326
Continued moratorium	273
Amendment 7 Limited Entry Program	430
Dual permits	669
Open access	924

[17] Estimated as 10% of mark-up.

[18] Whether there would be an increment of income to Hawaii trollers and handliners is not known.

[19] Figures were estimated using percentages of gross revenue for the longline fleet.

[20] Based on a 10% supplier income on 25% value-added.

In addition, Honolulu has limited dock space. Queuing problems already exist, in terms of waiting for space along the wharf. An increased longline fishing fleet would exacerbate these problems, perhaps reducing the number of fishing days available to a vessel over a year. If we assume that one-half day would be lost per trip, due to queuing in the absence of a complete moratorium, thus reducing the number of trips per year, then the annual loss per vessel in lost fishing time would be $9,000 per year in lost net income.

VI.C.2.g. Risk of overfishing

One reason for the initial moratorium was a conservation concern related to the main species landed by the rapidly growing longline fishery. Of the various species taken in Hawaii's longline fishery, only landings of swordfish are a significant percent of the Pacific-wide stocks. There is no way to estimate either the risk of overfishing or its economic cost at this time. The level of risk is probably a function of the number of longline vessels in the fishery. Under the Continued moratorium alternative, only the 1% probability of over-fishing is considered likely. Under the Amendment 7 limited entry program, a 5% probability is evaluated, and under the Dual permit and Open access alternatives, 10%. In this case "over-fishing" is considered to be the collapse of swordfish availability, so that its catch rate is zero.

The economic cost will be evaluated as the relocation cost incurred by the Hawaii pelagic fishery of a shift of half the swordfish fleet back to mainland US fisheries and the cost to the remaining Hawaii fleet of a zero catch rate for swordfish. The cost of shifting into mainland US fisheries by swordfish longliners choosing to give up the western Pacific is evaluated as equivalent to the costs identified for the excluded longliners (effect #1): $ 75,000 per vessel, one-time sunk cost.[21] The effect of shifting half of Hawaii's longline swordfish fishing effort into Hawaii's longline tuna fisheries is a per vessel annual loss of $15,000 in net revenue and $27,000 in total income (including labor share) should the swordfish fishery collapse.[22]

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[21] This cost is pro rated across 10 years in the estimation of fleet-wide impacts using a present value calculation of 10% discount rate.

[22] These costs are also evaluated on a 10-year basis and discounted in present value terms.

VI.C.3. Fleet- and industry-wide impacts

The following section provides a qualitative ranking of the management options. This section applies estimates of per vessel costs or benefits (as discussed in the previous section) to estimates of total fleet size (Table VI-5) and independent industry-wide estimates (e.g., market impacts). The relative impacts of the four alternatives (continued moratorium, limited entry with unrestricted transfers/upgrades, dual permits and open access) evaluated across the seven possible economics effects, are displayed in Table VI-10. The impacts are presented qualitatively to indicate which types of effects are likely to have the greatest and least impact and which types of vessels and segments of the industry are likely to be affected the most and the least.[23] It must be re-emphasized that the quantitative basis for making these qualitative comparisons is extremely weak, but it is the best available information.

Another fleet-wide potential problem is over-capitalization, i.e., more resources are expended than are required to efficiently harvest the available resources. Over-capitalization leads to reduced profitability to individuals as well as decreased benefits to the nation. The relative risks of over-capitalization was calculated using the results of the simulation model (Table VI-3). The Amendment 7 limited entry program had a relatively low risk factor (ranking of 2), second lowest only to the continued moratorium alternative (rank 1). The dual permit alternative had a greater relative risk (ranking of 4), second only to the open access alternative (rank 5).

VI.C.4. Separable issues

There are several other economic and social issues which deserve further discussion:

VI.C.4.a. Transferability of permits

The original moratorium allowed permits to be transferred only once with the sale of the vessel during the three years of the moratorium. Alternatives would be for permits to be freely transferable or not be transferable at all. This issue was addressed several times by the Council during the current moratorium, with no changes being made in the permit transferability rules. As discussed above, the most recent discussion of permit transferability addressed four alternatives, including freely and non-transferable permits, and harvesting capacity upgrading and harvesting upgrade restrictions.

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[23] Although the effects are presented qualitatively to stress their conjectural characteristics, they were actually quantified. The range of effects, except for the increase in longline income due to expansion of the fleet, is form minus $1.0 million to plus $1.2 million. The impact of the alternatives on longline fleet net income ranges from minus $1.2 million to plus $16 million.

Table VI-10. Hawaii Longline Limited Entry Alternatives: Summary of Potential Effects. Relative income gain/loss from management alternatives.

Effect	Continued Moratorium	Limited Entry	Dual Permits	Open Access
1. Longline Vessel Income				
Included Longliners	- - - -	+++++	+++++	+++++
Excluded Longliners	- - -	- -	0	0
2. Catch Competition				
Longliners	0	0	0	0
Troll/handline	0	0	0	- -
3. Gear conflict				
Longliners	0	0	0	0
Troll/handline	0	0	0	-
4. Market Competition				
Longline	0	0	0	0
Troll/handline	++	-	-	- - -
Mainland longline	??	??	??	??
Mainland consumer	??	??	??	??
Hawaii consumers	??	??	??	??
5. Seafood market volume effects				
Hawaii wholesale	- -	++	++++	++++
6. Shoreside provisioning and infrastructure				
Hawaii suppliers	-	++	+++	+++
Longline queuing	0	0	- - -	- - -
7. Risk of overfishing				
Swordfish longliners	0	-	- -	- - -
Remaining longliners	0	-	- -	- -
Troll/handline	0	0	0	-

The economic essence of the transferability issue is whether a permitted longline fishing vessel has an equivalent asset value outside the Hawaii longline fishery. Restricting the transferability of longline permits may have other impacts, such as reducing the fleet size by attrition and redistributing income and wealth, but these impacts are directly related to the asset value issue. A longline fishing vessel is an asset whose income is based on the ability of the vessel to fish productively. Any limitation on the flexibility of vessel use diminishes its value as an asset. With the two main alternative fisheries in Hawaii under limited entry regimes (NWHI lobster and bottomfish), the primary alternatives under a restricted permit transfer system are mainland US fisheries, but many of these fisheries are also under limited entry regimes. Although the first sale of a Hawaii longline fishing vessel under the proposed regulation would not be restricted, the buyer would have to discount the value of the vessel since his/her options for re-sale are limited. The vessel would either have to leave the fishery after a second sale, or the new owner would have to expect that the permit transfer restriction would be lifted at the end of the moratorium.

There is no precise way to evaluate this risk. For discussion purposes, however, the risk might be viewed as equivalent to the difference between the prime interest rate charged by banks to their best commercial customers (10.0%) and the consumer interest rate (18% in Hawaii). The difference, 8%, applied to the value of the average Hawaii longline fishing vessel would be $40,000.

Experience has shown that some 10% of fishing vessels in Hawaii change hands annually. Using a sequential probability, 30% of the current fleet might change hands once, and 3% more than once during the three years of the moratorium. The potential fleet-wide effect of a continued restriction on permit transfer would be $168,000 under a single-transfer proposal, and $1.7 million under a no-transfer alternative, compared to the free transfer alternative.

No evaluation of the effects of restrictions on harvesting capacity is undertaken, since these are essentially equivalent to limiting or increasing fleet size. However, there is a potential safety factor involved in restricting the ability of owners to upgrade their vessels. The economic costs of accidents at sea are clearly secondary to the human costs and are usually "estimated" in litigation. There are currently two cases of NWHI lobster vessels that sank and these may provide some information on the economic cost of the risk associated with vessel safety.

VI.C.4.b Socio-political considerations

Independent of the direct economic effects of the alternative management scenarios, several sociological and political considerations should be discussed which are peculiar to the Hawaii fishery. These considerations have not been evaluated even in a qualitative manner, but their potential effects are highlighted in terms of whether they support the benefits or costs of the management alternatives.

Native Hawaiian rights

The circumstance by which the USA gained control in 1898 of Hawaii, formerly an independent nation, and the current socio-economic status of native Hawaiians, suggest that the effort limitation alternatives should be evaluated in terms of differential impacts on native Hawaiians.

First, the reservation of some longline permits for native Hawaiian fishermen or corporations could be considered as an partial "remedy" for past grievances and the current socio-cultural deprivation. Reservation of permits suggests that the costs of the moratorium alternatives to other groups of longliners would be greater (since fewer permits would be available) or that the benefits to the remaining longline and troll/handline vessels would be less (because more permits in total would be issued), both corresponding to a relatively higher level of benefits for native Hawaiian longline fishermen.

Second, there may be a non-pecuniary impact of continued longline fishing on rural native Hawaiian communities. To the extent that longline fishing diminishes the fishing experiences and subsistence values of ika-shibi and palu-ahi handline fisheries, the impact of the moratorium alternatives on rural native Hawaiians argues for a more liberal approach toward evaluating the costs of expanding longline fishing.

Traditional fishing practices

Independent of the native Hawaiian rights issue is that of traditional fishing practices in Hawaii. Longline fishing was introduced to Hawaii by Japanese immigrants shortly after the turn of the century. For those early Japanese immigrants, fishing was an important alternative source of employment, and a means for developing small businesses. Furthermore, tuna and billfish landed by longline fishing vessels have played a key role in the assimilated Japanese-American culture in Hawaii. Limits on the capability of the ancestors of these immigrants to continue and expand their participation in the longline fishing and seafood marketing have a subtle, but important, socio-political impact in the community. A similar situation pertains to Korean immigrants who became the mainstay of the traditional sampan longline fleet in the late 1970s and in the 1980s. Consideration of these factors suggests a more conservative evaluation of the benefits of the effort limitation alternatives to the extent that the alternatives reduce the ability of these ethnic groups to expand or continue their participation in the longline fishery.

Troll and handline fishing has been part of rural communities in Hawaii for decades, including the role of charterboat and recreational fishing. Consideration of the potential effect of increased longline fishing on these communities suggests a more liberal evaluation of the benefits of the alternatives.

Hawaii fisheries have always been socially heterogeneous, and community-based means of "patrolling" the ocean have been common. The intrusion of large numbers of longline fishing vessels into Hawaiian waters has upset the balance by which large-scale commercial fishing operations and small-scale commercial, subsistence and recreational fishers have been traditionally able to mediate their inter-relationships. Consideration of this effect also suggests a more liberal evaluation of the benefits of the moratorium alternatives.

VI.D. Administrative Impacts

Most of the administrative elements (and their associated costs) now in place under the current three-year moratorium would continue under the proposed amendment, as follows:

VI.D.1. Limited Entry Permits

The Southwest RD would continue to administer the limited entry permit program. By eliminating the dual permit requirement (i.e., a limited entry permit for the Hawaii-based fishery would meet the requirement for a general permit for all other areas under the Council's jurisdiction), there will be no need for an annual renewal of longline permits, and confusion for the fishermen should be reduced.

The elimination of documentation requirements that were required for many in qualifying for initial permits will be a reduction in permit administration. Further, the liberalization of permit transfer rules will reduce the burden of determining if a transfer is permissible and maintaining and reviewing files concerning transfers. There will be no need to determine if ownership of the underlying interest in the vessel had changed. However, the permit process will require more documentation as permits will be transferable apart from the vessels. There will have to be a central register of permit holders, and the register will have to be maintained as closely as the current permit register.

The cost of administering the limited entry permit program varies annually and depends on changes to direct and indirect costs incurred by the Southwest Region. The amount of fee levied by NMFS to administer the program is determined according the established Federal (NOAA, US Department of Commerce guidelines governing cost computation associated with permit product and services provided by the Southwest Region. The guidelines require in the computation direct labor costs of all NMFS personnel involved in the administration of the Western Pacific longline permit program including wages, compensation, cost-of-loving adjustment, supplies and materials, postage, printing etc. and indirect costs such as NOAA support, rent, etc. The initial cost for administering the Hawaii longline limited entry permit program is estimated to be between $40-$50 per application.

VI.D.2. Enforcement

NMFS Enforcement and the US Coast Guard now estimate that about 50% of the total fisheries enforcement effort in the region is directed to the pelagic fisheries, and most of this effort is directed to the longline sector. The total estimated expenditures are $1.5 million, excluding vessel patrols.

VI.D.3. Plan Monitoring and Review

The Council Pelagics Plan Team includes members from all island areas as well as NMFS staff in Honolulu. The Plan Team prepares the annual report required under the FMP and in-season reports, as needed. The Council budget includes funds for travel and staff support for non-NMFS members of the Plan Team. In addition, about one-third to one-half of all Council meetings and associated costs are spent on pelagics-associated issues, including this and future amendments, annual reports, and documentation under the framework procedures to address in- or between-season problems. The estimated annual cost of monitoring the plan is about $300,000 per year for the Council. NMFS scientists and staff also made major contributions to the development of this amendment, and will continue to participate on the Plan Team and prepare reports for the Council, at an estimated cost of $100,000 per year.

The adoption of the framework process should result in some savings in administrative costs. The process focuses the public review function at the Council level and reduces the extent of publication of proposed and final rulemaking in the Federal Register. The magnitude of change cannot be predicted because the number and nature of potential changes through the framework process on an annual basis cannot be predicted. In the past, however, there have been as many as six actions with proposed and final rules in one year; if a single publication could have sufficed for half these cases, there would have been a savings of about 15 pages of Federal Register publications or $5625. More important, however, is that the amount of time between the identification of a problem and the implementation of a solution could be reduced by 45-90 days, depending on the nature of the action and the extent to which it might be delayed in the many steps required to promulgate rules. There is no way to quantify what these savings might mean to the fishermen or the living marine resources involved.

VI.D.4. Reporting Requirements

NMFS receives and processes longline logbooks and provides reports to the Council. The estimated cost of this data processing and reporting function is about $65,000 per year.

VI.E. Vessel Safety

The restrictions on vessel upgrading that were in place during the moratorium have resulted in vessel safety concerns, particularly for small vessels having to fish beyond 50-75 miles because of MHI area closures and vessels which may wish to travel to distant water swordfish grounds. The proposed limited entry program will enhance vessel safety in the longline fishery since it will provide a mechanism for upgrading to the length of the longest vessel active during the moratorium.

VI.F Impact on Protected Species

The available data do not permit a specific determination of the impact the longline fishery will have on protected resources. Observers placed on longline vessels by NMFS have documented takes, but the level of observer coverage has not been sufficient to establish a basis for an estimate of total take that has known confidence limits. Fishermen have reported takes in logbooks, but reporting may be incomplete. Section III.G. provides information on the status of protected resources and reported rates of take of different protected species in the longline fishery.

In the Biological Opinion and Incidental Take Statement (Appendix 3), NMFS provides information concerning the estimated rates of take of turtles in a number of longline fisheries throughout the world. The range of rates of take is extremely broad, and it is not known which (if any) is most representative of the rate that actually occurs in the Hawaii-based longline fishery. It is noted that the May 1991 Biological Opinion estimated turtle takes in the Hawaii longline fishery was based on the rate reported for the Gulf of Mexico longline fishery. However, for the 1993 Biological Opinion, NMFS uses the rate of take observed on longline vessels in the waters around the Hawaiian archipelago. Again, it is not known which of these rates is more representative of the rate actually experienced by the longline fishery, especially now that the some of the areas where takes were observed are now closed to longline fishing. Nonetheless, NMFS based its incidental take limit under the new Incidental Take Statement on a rate of take of 0.061 turtles per 1,000 hooks, with an estimated mortality rate of 0.012 turtles per 1,000 hooks.

The actual level of take of turtles that will occur under the proposed action cannot be predicted with any confidence until additional information is available through the mandatory observer program now being established. The level and rates of take will depend on the amount of fishing effort, its distribution, and possibly seasonal shifts in fishing effort and the vulnerability of turtles to incidental capture. If the rates of take and mortality used in setting the allowable take under the 1993 Biological Opinion are applied to the estimated level of fishing expected to occur under the proposed action, the total turtle take would be 939 turtles, with mortality of 373 turtles. If the rates used in the 1991 Biological Opinion are used, total turtle take would be 277 turtles with mortality of 33 turtles. If the reported rates of take are used, the level of take would be between 28 and 29 turtles.

While it is unknown whether the level of take will exceed the level under current conditions, the number of active vessels may increase for two reasons. First, the eligibility criteria are expected to encourage some inactive vessels to be activated so that, if nothing else, the owner subsequently can have a new limited entry permit for possible sale. Second, the allowance for upgrading is expected to result in some permit holders obtaining new vessels capable of fishing beyond nearshore grounds now closed to longlining, while others may upgrade vessels in order to participate in the swordfish fishery. However, it is unlikely that all vessels will be active, particularly in the short term. Buying a new vessel or enlarging an exisiting vessel requires a substantial financial commitment. In addition, some permit holders are actively involved in alternative fisheries (e.g., the lobster fishery).

Total effort (measured by total hooks deployed) may not increase, even if participation increases. While more vessels may be active, the average hooks per vessel could drop if there is a shift from smaller vessels to larger vessels which generally set fewer hooks per day when fishing for swordfish. In fact, in 1992, the average small vessel set 116,000 hooks compared to 88,200 and 92,400 for the average medium and large vessel, respectively.

Only with the collection of observer data will it be possible to determine the actual total turtle take and rates of take by species and area. The proposed framework procedures are intended to provide the Council and NMFS with the ability to respond rapidly to new information demonstrating a need for action to protect threatened and endangered species. For example, observer data might provide a basis for implementing seasonal closures or gear restrictions to prevent excessive take of sea turtles. The framework procedures would allow rulemaking to deal with such problems rather than requiring an amendment to the FMP.

The take of seabirds would be expected to increase compared with current conditions. There are no data on rates of take other than reported takes (see III.G.). In 1992, a total of 100 birds were reported taken in the fishery at a total fishing effort of about 11.6 million hooks. Using this rate of take, if the longline fishery deploys 16.3 million hooks per year under the proposed action, the take would be 141 birds.

The take of whales, porpoise, and other marine mammals is very rare and would not be expected to increase to a significant level under the proposed action. Records from observers will provide a sound basis for estimating the take (if any) of marine mammals in the longline fishery in the future.

VI.G Impacts on Habitat

The fishery as it will operate under Amendment 7 will not affect the habitat of pelagic species or associated living marine resources. Longline fishing occurs over a very large area of ocean. While there may be a net increase in the total longline effort compared to current conditions, and thus, increased fuel use and associated emissions, the increase in emissions will not pose any habitat risks. No habitat components known to be especially important for feeding or spawning will be affected

by the fishery. There may be an increase in discard of offal from gutting and cleaning fish on board longline vessels, but this also will be spread out over a large area. Longline vessel operators must comply with the Marine Plastic Pollution Research and Control Act and, therefore, are prohibited from discarding plastic light sticks at sea. Marine habitat quality is expected to remain high under the FMP.

VI.H International Implications

A difficult issue in this amendment is the extent to which regulations should be imposed on US fishermen on the high seas. The Magnuson Act provides authority to manage fisheries beyond the EEZ, provided there is some clear linkage to the achievement of optimum yield from the portion of the fishery on the same stocks in the EEZ. In this instance, fishing with longline gear on the high seas for swordfish and tuna clearly has a linkage with fishing in the EEZ for swordfish, tuna, and other large pelagics. Vessels fishing outside the EEZ employ Hawaii residents, buy supplies from Hawaii businesses, and off-load their fish in Hawaii. Their activities are important to the economy of Hawaii. The volume of their landings may affect prices paid for fish landed by vessels fishing within the EEZ. Many vessels that fish outside the EEZ spend some time fishing in the EEZ, as well. Catches made outside the EEZ may affect the status of stocks in the fishery management unit and may affect the catches by vessels fishing in the EEZ.

However, it is not clear that there is a strong basis for regulating US fishing or effort on the high seas. There are no convincing signs that US catches are affecting the stocks, although such impacts could be occurring without detection, due to a lack of data on the status of stocks throughout their range. There also is no clear evidence that catches outside the EEZ are affecting catches inside the EEZ. The impact of longline landings from outside the EEZ on prices received by vessels fishing in the EEZ also is not established. Under these circumstances, it is not clear that anything is gained by controlling access to the waters outside the EEZ. In fact, it is probably to the nation's benefit if the fishery outside the EEZ continues to grow if that can be accomplished without serious harm to fisheries in the EEZ and without adverse impacts on the stocks.

Further, it could be viewed as disadvantageous to US fishery interests if US access to high seas fishing areas were curtailed when there is no similar constraint on foreign fisheries. If there is ever an international agreement to manage overall pelagic species harvests in the Pacific, it would be in the interest of the USA to be in a position to be able to demonstrate a historic interest in a larger share of the fishery than it now has.

On the other hand, events in other areas of the world demonstrate that achievement of international agreement on conservation and sharing of fishery resources almost always comes only after stocks have been reduced. A case in point is the Atlantic swordfish fishery. That fishery grew rapidly for years, but the international community (in this case, the International Convention for the Conservation of Atlantic Tunas) did not take action until presented with overwhelming evidence that the stock had been

significantly reduced, and that conservation measures were urgently needed. Invariably, such reductions cause both severe economic and social pain, as well as political disruption. It would be in every nation's interest to avoid a repetition of this pattern in the Pacific. The Council and NMFS could demonstrate a leadership role by managing US fishing on the high seas in hopes of getting other fishing nations to enter into agreements to exchange fisheries data and coordinate management efforts.

The concern over the impact of longline fishing on turtles also has international implications. Estimates of turtles takes in the Japanese distant water longline fisheries far exceed those estimated for the Hawaii-based fishery. Reductions in overall turtle-longline interactions will require international cooperation.

The limited entry program proposed under Amendment 7 shows concern about the potential for overfishing and protected species interaction, and takes a leadership position in relation to other countries that impose little restraint on their fisheries on the high seas. On the other hand, restrictions on vessel upgrades may limit the ability of Hawaii-based longliners to participate in the distant-water swordfish fishery throughout the Pacific. Still, some increased harvest of swordfish is anticipated under the proposed limited entry program; this will help generate additional information for stock assessments, information that can be shared with other nations in development of agreements concerning the abundance and yield of pelagic stocks throughout their range. The increased US catches can place the USA in a better position in any future negotiations dealing with allocations through international organizations, though less so than would have been possible under the limited entry alternative with no restrictions on harvesting capacity.

VI.I. Impacts of Other Proposed Actions and Alternatives

VI.I.1. Framework Process

Adoption of an improved framework process should simplify the adjustment of conservation and management measures, and reduce the costs of those adjustments to the federal government. Once the process is in place, many future adjustments could be made with a single notice in the Federal Register rather than through proposed rule and comment procedures. The notice process is faster and entails less cost for Federal Register publications. In addition, there is less administrative cost to the Department of Commerce because the authority has already been delegated to NMFS for many of the required actions. Quantifying the cost savings is difficult because it cannot be predicted how many actions will be taken in the future, but it appears likely (based on past actions) that two or more notices and comment rulemakings each year can be eliminated through the framework process.

This will not reduce the costs to the Council, which will continue to be required to have a sufficient basis for proposing that action be undertaken. In fact, there will probably be more pressure on the Council because the framework process essentially places the full burden for determining and justifying the desired action on the Council.

There will continue to be measures that can be implemented only through "notice and comment" procedures, (e.g. initial application of requirements to a new fishery sector), even if such requirements already apply to some other sector and are readily understandable.

Adoption of the framework processes will not result in any biological, economic or social impacts. Each action taken under the framework processes will entail documentation of the analysis of impacts of that action. To the extent appropriate, the Council will need to prepare regulations, regulatory analyses, environmental assessments, or other documents depending on the scope of the action, which framework process (if any) is being used, and the types and magnitude of impacts involved.

VI.I.2. Allowing Non-permitted Vessels Access to Hawaii Ports

Amendment 7 would allow operators of longline vessels that fish exclusively beyond the EEZ to enter ports in Hawaii to reprovision or conduct repairs. Operators of such vessels would not be allowed to off-load their catch in Hawaii. This alternative is not expected to have any significant impact on the Hawaii-based longline fishery, other fisheries, or the stocks. It does provide to US vessel operators the same port privileges that are afforded to foreign longline vessel operators. To the extent any other longline vessels take advantage of this opportunity, there will be some benefits to shoreside suppliers. However, there is no indication that a substantial number of vessels will choose to operate in this manner.

VI.I.3. Modifying the List of Pacific Pelagic Management Unit Species

Amendment 7 proposed to add selected species to the list of management unit species. This will not affect the manner in which the fishery operates or the stocks involved. However, it will ensure that longline vessel operators record and report their catches of all pelagic species that are in the unit. For example, moonfish are valuable species in the catch, but the amount caught, retained, and sold is not known. Data are, therefore, not available for stock assessments or economic analyses of the fishery. This would be corrected by this action.

VI.I.4. Modification of Optimum Yield (OY) Definition

The proposed revisions to the definition recognizes that OY is defined to encompass fishing by all vessels that fish under the FMP, as amended. As currently defined, OY could be construed to be a result of fisheries that occur under management rules that apply only in the EEZ. This amendment clearly considers the Hawaii-based longline fishery for swordfish and other species beyond the EEZ to be part of the management unit. The revised definition of OY recognizes that all US vessels that fish for pelagic management unit species throughout their range can affect the stocks that occur in the EEZ, as well as beyond, or can affect the fishing patterns and the catch rates and success of vessels that operate primarily in the EEZ. By taking this approach, the

FMP will promote the management of all of the fisheries that operate throughout the range of the target species, involved and not look at EEZ fisheries in isolation.

VI.J Unavoidable Adverse Effects

The proposed action is expected to result in some increase in longline fishing activity and, thus, increased fuel use and associated emissions of waste heat, gases, and water. There will be some added wastes from cleaning of fish at sea. Neither of these results is significant. The proposed action also will result in the take of sea turtles and marine birds. While most turtles are released alive, there will be some incidental mortality (see Biological Opinion). At present, there is no known way to avoid such impacts.

VI.K. Short-term Use of Environment Related to Long-term Productivity

The proposed action is expected to result in achievement of the objectives of the FMP and the achievement of OY (a long-term management concept) from the pelagic fisheries based in Hawaii. The long-term productivity of the stocks taken by Hawaii fisheries will be maintained (to the extent practicable). The longline limited entry program contains mechanisms to adjust fishing effort and/or catch as more information becomes available. Restrictions will be imposed if necessary to maintain the stocks or prevent adverse impacts on other fisheries in the EEZ. The proposed action does not involve short-term use of resources at the expense of long-term productivity.

VI.L. Irreversible or Irretrievable Commitment of Resources

As indicated, there will be irreversible increases in the use of fuel if the longline fishery expands. No other irreversible results are expected. If new information demonstrates a need to curtail the longline fishery (or any other fishery) to maintain the productivity of pelagic fish stocks, action can and will be taken by the Council. Similarly, if it becomes necessary to regulate longline fishing to protect marine turtles, seabirds, or other species, such action also can be taken under the framework procedures of the FMP.

VI.M. Mitigation Measures

The proposed action includes periodic FMP plan evaluations and framework procedures so that problems can be rapidly identified and action can be rapidly taken to adjust fishing effort or catch (or both) to ensure of the long-term productivity of the fish stocks subject to fishing under the fishery management plan and to ensure that any protected species are not jeopardized. The complementary observer program which will be established through existing FMP framework procedures will provide up-to-date information on interactions with protected species and on total catch and discards in the longline fishery, which may lead to improved methods to limit bycatch in the longline fishery.

VII. FURTHER EVALUATION OF PROPOSED ACTIONS

VII.A. National Standards of the Magnuson Act

VII.A.1. Prevent Overfishing While Achieving Optimum Yield (OY)

The proposed limited entry program is expected to prevent overfishing while achieving OY from the fisheries in and around the Hawaii EEZ. Such managed fisheries should not measurably impact Pacific pelagic stocks since US landings account for only a small fraction of the total catch. However, if a detectable impact does occur (e.g., swordfish in the North Pacific), fishing effort and mortality may be adjusted through FMP provisions to prevent long-term adverse impacts. The number of permitted vessels will be no more than that issued under the moratorium (166). Longline effort will be capped by the limits on number of vessels and vessel upgrading. However, effort may expand above current (1993) levels. This may include a shift to larger vessels, but no vessel larger than the longest vessel active during the moratorium will be allowed to fish. Based on present vessel activity patterns, larger vessels would be expected to fish mostly beyond the EEZ. This change should not affect nearshore catch rates of troll and handline fisheries. Maintaining the local availability of pelagic stocks for troll and handline fisheries is a goal of the FMP. However, if adverse impacts are detected on any component of the fishery, the FMP provisions will allow for correction.

VII.A.2. Best Scientific Information Available

This amendment incorporates the best scientific information available. Simultaneous with implementation of the moratorium in 1991, the Council developed a 3-year plan to improve the scientific base of information to support long-term decisions for management of the longline fishery. Unfortunately, the initial set of pelagic fishery research projects did not begin until mid-1993 due to bureaucratic delays. Therefore, 1991 and 1992 data are from the federal longline logbook program, state catch and effort reports and federal/state market monitoring programs.

VII.A.3. Management as a Unit Throughout the Range

The FMP and this amendment acknowledge that the range for Pacific pelagic management unit species extends throughout the Pacific. At present, there are no international agreements for data collection and exchange, cooperative stock assessments, or for monitoring and management of Pacific pelagic fisheries. The Council has long promoted the development of such organizations and programs, which are necessary for stock-wide management. Consequently, the Council has consistently attempted to manage the US fisheries in the EEZ or surrounding waters, to prevent overfishing and achieve OY to the extent practicable.

VII.A.4. Do Not Discriminate Between Residents of Different States and Allocations

The FMP and this amendment do not discriminate between residents of different states of the USA. The limited entry program indirectly allocates fishing privileges in that only people holding permits will be permitted to fish for, possess, or land longline-caught fish in the EEZ. However, the program provides for market forces to carry out this allocation as permits are freely transferable, and holders can sell, lease or trade permits to suit individual circumstances. The initial allocation of permits will be to the current or most recent holders of permits who have made landings of longline-caught fish in Hawaii or who met certain exemption criteria. This was deemed the fairest way to make the transition from the moratorium to the new limited entry program.

VII.A.5. Promote Efficiency

By allowing market forces to determine who will ultimately obtain limited entry permits for the longline fishery, the new program fosters efficiency. However, capping the number of longline permits at 166 and placing a limit on upgrading of individual vessels is intended to manage growth and prevent adverse impacts on other established commercial fisheries, recreational fisheries, for pelagic species and protected species. Thus, the limited entry program does not have economic allocation as its sole purpose.

VII.A.6. Allow for Variations

The FMP and this amendment acknowledge the limitations of the available data and the lack of ability to predict fishermen's reactions to new regulations or the stocks' reactions to new fishing patterns and environmental variability. The proposed action includes framework procedures to allow timely response to new information that demonstrates a need for action to address biological, economic or social problems. This includes the possibility of reducing the level of effort or catch in the longline fishery due to stock declines or adverse impacts on related fisheries.

VII.A.7. Minimize Costs and Duplication

The FMP and this amendment should prevent overfishing and achieve OY in a cost-effective manner. The FMP and this amendment do not duplicate any other Federal regulations or state fishery management measures.

VII.B Limited Entry Considerations

The Magnuson Act provides that a system for limiting access to a fishery may be proposed by a Council, but the Council must take into consideration six specific factors in developing such a program, as follows:

VII.B.1. Present participation in the fishery

The Council is aware that, although 166 longline permits were issued under the limited entry moratorium eligibility criteria, about 22 permitted vessels had not fished by September 1993. Several factors may account for the level of inactivity. Subsequent establishment of area closures around the MHI precluded the activity of some small vessels. Some owners were unable to fish and were also unable to sell their vessels due to the limits on subsequent permit transfer. Other owners may have been active in other fisheries, either in the Hawaiian Islands or in other areas. Under the proposed limited entry program, permits will be initially issued to all moratorium permit holders who either landed fish in Hawaii at some time between 23 April 1991 and 22 April 1994, or met certain exemption criteria. Thus, all presently active participants will be eligible for new permits. It is estimated that most moratorium permit holders will either meet the landing requirement or qualify for an exemption.

VII.B.2. Historical practices in and dependence on the fishery

No one who was historically active in the fishery and is dependent on it will be denied eligibility for continued participation. If such individuals are unable to fish with their new permit, they may obtain a replacement vessel to resume fishing or lease or sell the permit to another party. The amendment does not affect those who have historically been in troll and handline fisheries. These fishermen may obtain permits through purchase, lease or other arrangements if they wish to enter the longline fishery.

VII.B.3. The economics of the fishery

The proposed measures provide for transferability of permits and allow limited vessel upgrades. The area closures imposed after the moratorium went into effect may have prevented a number of longline vessel owners from fishing with their permits. The proposed limited entry program will allow these persons to obtain new vessels to resume fishing. Alternatively, they may sell or lease their permits allowing new persons to fish. In any event, the new rules should allow permit holders to fish and run their businesses in a more economically prudent manner than allowed under the current moratorium.

VII.B.4. Capability of vessels to engage in other fisheries

The Council recognizes that limited entry has already been established for other fisheries in the Hawaii EEZ and other areas, and that alternatives for excluded longliners are few. This is a principal reason why the Council chose to provide an opportunity for all current permit holders to continue to hold permits under the replacement limited entry program. By allowing a mechanism for vessel upgrades, the amendment will allow permit holders adversely affected by area closures to obtain larger vessels and resume fishing safely beyond these closed areas.

VII.B.5. Cultural and social framework

The current rules have effectively precluded some historical participants of the longline fishery. The combination of area closures around the MHI and restrictions on permit transfers during the moratorium period most severely affected owners of small vessels are persons who historically fished closer to shore. By allowing upgrades and permit transfers, the Council is attempting to allow those historical participants an opportunity to shift to larger vessels or to sell or lease their permits so they can find other ventures.

VII.B.6. Other relevant considerations

The Council considered the possibilities of more or less than 166 permits. It concluded that more permits may increase the risk of overfishing and of adverse impacts on other fisheries to unacceptable levels. The USA may be disadvantaging its fleet relative to competing nations' fisheries on the high seas by not allowing a larger fleet or not exempting from limited entry vessel owners who agree to put VMS on their vessels while fishing solely outside the EEZ. However, this decision was deemed appropriate given the uncertainty about the status of swordfish stocks and the concern that if stocks outside the EEZ collapse, there would be pressure to allow such vessels to fish in the EEZ. Alternatively, if only people who were active in the fishery in 1992 (for example) had been deemed eligible for new permits, then the Council would have unfairly restricted the opportunity for people disadvantaged by the area closures and permit transfer limitations to fish economically.

The Council also considered allowing unrestricted permit transfers and vessel upgrades, as well as maintaining the highly restrictive permit transfer and vessel upgrade rules of the moratorium. The proposed course of action limits increases in overall potential capacity but intends to allow those who have been disadvantaged to have some basis for either investing in larger vessels or selling or leasing their permits so they can recapture some of the costs of their original investment.

VII.C Achievement of FMP Objectives and OY

The definition of OY was amended in 1991 to reflect management goals within the EEZ around each island and throughout the range of the stocks. The proposed definition, incorporating the clarifications described earlier (V.D.3), is as follows:

> OY is the amount of each management unit species, or species complex, that can be harvested by domestic and foreign fishing vessels in the EEZ and adjacent waters, to the extent regulated by the Fishery Management Plan, without causing "local overfishing" or "economic overfishing" within the EEZ of each island area, and without causing or significantly contributing to "growth overfishing" or (worse) recruitment overfishing on a stock-wide basis.

The FMP, as amended, and its implementing regulations are designed to meet several overall objectives:

1. To manage fisheries for management unit species in the Western Pacific Region to achieve optimum yield.

2. To promote, within the limits of managing at OY, domestic harvest of the management unit species in the western Pacific EEZ and domestic fishery values associated with these species. For example, by enhancing the opportunities for:

   a. satisfying recreational fishing experience,
   b. continuation of traditional fishing practices for non-market personal consumption and cultural benefits, and
   c. domestic commercial fishermen, including charterboat operations, to engage in profitable fishing operations

3. To diminish gear conflicts in the EEZ, particularly in areas of concentrated domestic fishing.

4. To improve the statistical data base by conducting improved stock assessment and fishery evaluations, thus supporting fishery management and resource conservation in the EEZ and throughout the range of the management unit species.

5. To promote the formation of a regional or international arrangement for assessing and conserving the management unit species and tunas throughout their range.

6. To preclude waste of pelagic management unit species associated with longline, purse seine, pole-and-line or other fishing methods.

7. To promote, within the limits of managing at OY, domestic marketing of the management unit species in American Samoa, Guam and Hawaii and the Northern Marianas Islands.

This amendment is consistent with the objectives of the FMP and is intended to achieve the OY from the pelagics fisheries.

VIII. RELATIONSHIP TO OTHER LAWS AND DIRECTIVES

VIII.A. Executive Order 12866

The proposed amendment is not considered a major action according to the definition of Executive Order 12866, i.e., the proposed action will not have an effect on the economy of more than $100 million. Nevertheless, section VI.C meets the impact assessment requirement of this executive order.

VIII.B. Regulatory Flexibility Act (RFA)

The RFA requires a determination as to whether a proposed rule has a significant impact on a substantial number of small entities. If the rule does have this impact, then an Initial Regulatory Flexibility Analysis (IRFA) has to be completed for public comment. The IRFA becomes final after the public comments have been addressed. If the proposed rule does not meet the criteria for "substantial number" and "significant impact", then a certification to this effect must be prepared.

For the purposes of the IRFA, the firms directly involved in the pelagics fisheries and potentially affected by the proposed action are owners of commercial longline fishing vessels (166, directly affected), commercial troll and handline fishing vessels (about 1500 vessels, including vessels used part-time, indirectly affected), commercial charter vessels (about 250, indirectly affected), and recreational fishing vessels (known number, but probably in the range of 3,000-6,000 indirectly affected); owners of seafood brokerage and wholesaling firms (100-200, indirectly affected); and owners of suppliers to commercial and recreational fisheries (unknown number, perhaps 10-20, indirectly affected). All of these firms are classified as small entities and all may be affected to some degree.

Therefore, for this proposed action, the "substantial number" criterion is met.

The determination relative to the "significant impact" test can be triggered by several conditions, one of which is a change in annual gross revenues of more than 5%. The proposed action is expected to result in up to an 34% increase in the gross revenue (assuming all permits would be active) to the longline fleet, with little or no impact on other fishery sectors. The amount of fish local brokers and dealers would handle will probably increase by 5-20% since much of the longline catch is directly air freighted from Hawaii to the US mainland. In any event the test for significance is met by this determination. Therefore, an RFA is required and the required information follows:

Explanation of Why the Action is Being Considered: The proposed action is being considered due to concern about the likely adverse effects of uncontrolled expansion of the longline fishery if no action is taken and the current moratorium lapses. It is generally agreed that some limitation on growth of the longline fishery should be maintained. Uncontrolled expansion of the longline fishery could result in overfishing

of some pelagic species (notably swordfish), and in adverse impacts on other commercial and recreational fisheries for pelagic species. The proposed action may result in expansion of the longline fishery to a level higher than has been active under the moratorium now in place but not to as high a level as would be expected without this action. Data collection under the FMP will continue and the effects of the expanded fishery will be evaluated periodically to determine if the effort needs to be reduced, or if further expansion of the fleet could be permitted to achieve OY.

Objectives and Legal Basis for the Action: The proposed action is taken under the authority of the Magnuson Fishery Conservation and Management Act, which established U.S fisheries management jurisdiction in the Exclusive Economic Zone (EEZ). The Act also established the Western Pacific Fishery Management Council and charged it with developing fishery management plans for fisheries in the western Pacific region. The Pelagics Fishery Management Plan, which the proposed action would amend, was approved by the Secretary of Commerce and implemented by Federal regulations in 1987. The objectives of the FMP are specified in Section VII.C of this amendment. The purpose of the proposed action is to ensure that the objectives of the FMP will be met by preventing overfishing of the stocks and maintaining healthy commercial and recreational fisheries through controls on expansion of the relatively new longline fishery.

Identification of Alternatives: The Council considered several alternatives to the proposed action. These are described and evaluated in the amendment.

Demographic Analysis: A demographic analysis was not conducted, although some data from the State of Hawaii Data Book and other sources were used in comparing the effects of the proposed action and alternatives.

Cost Analysis: The analyses in the amendment address costs and benefits of the proposed action and alternatives. It has been determined that the proposed alternative is cost-effective.

Competitive Effects Analysis: The industry is composed entirely of small businesses (harvesters, processors, brokers/dealers, suppliers) and is expected to remain so. Since no large businesses are involved, there are no disproportional small-versus-large business effects.

Reporting, Recordkeeping, and Compliance Requirements: These measures are designed to obtain information necessary to evaluate impacts of the proposed action on various sectors and associated industries of the fishery and to determine whether the objectives of the action are being achieved.

Identification of Overlapping Regulations: The rule would apply to longline vessels fishing in and around the Hawaii EEZ and landing their catch in Hawaii. There is only one set of regulations applicable to these fishing vessels dealing with pelagic species.

Efforts have been made to ensure that there are no overlapping regulations. Additional information may be found in section VI.D.1.

VIII.C. Paperwork Reduction Act

The proposed action will result in minor modifications of the approved information collection for the federal fisheries permit program. Overall, the information collection burden should be reduced as less documentation will be necessary for recording the issuance and transfers of permits. A request for approval of the modifications is incorporated in a request for renewal of the currently approved of the Southwest Region Permit Family of Forms (OMB No. 0648-0204).

VIII.D Coastal Zone Management Act

The proposed action will probably result in changes in fishing patterns by fishing vessels based in Hawaii. The approved coastal zone management plan of the State of Hawaii has been reviewed and the relationship of the proposed action to the plan has been evaluated. The NMFS has determined that the proposed action will be carried out in a manner that is consistent with that plan. This determination has been forwarded to the coastal zone management agency of Hawaii for concurrence.

VIII.E Endangered Species Act (ESA)

The proposed action is consistent with the Endangered Species Act. The Hawaii longline fishery takes several species of protected turtles, but the level and significance of the takes is not known. As a result of a reinitiation of consultation under Section 7 of the ESA, NMFS issued on 10 June 1993 a Biological Opinion and Incidental Take Statement concerning the take of sea turtles in the longline fishery. While the data on incidental take and mortality are weak, the potential take is of considerable concern. The opinion contains conservation recommendations for developing management policies and regulations through the Pelagics FMP which would help in reducing adverse impacts to listed species in the central North Pacific Ocean. The incidental take statement in the opinion authorizes taking of turtles in the longline fishery, but includes "reasonable and prudent measures" for NMFS to carry out, including establishment of a mandatory observer program. The conservation recommendations are not legally binding, but the reasonable and prudent measures are. These recommendations and measures were presented to, and considered by, the Council, and are evaluated with comments on the proposed action as presented in the FEIS. In the Council's view, the limited entry program, with observers and reporting of catch and effort, should provide a sound basis for determining the extent to which the longline fishery is impacting sea turtles as well as pelagic stocks and other fisheries.

VIII.F Marine Mammal Protection Act (MMPA)

The proposed action is consistent with the requirements of the MMPA. The Hawaii longline fishery is classified as a Category III fishery under the MMPA. Fishermen are not required to obtain Marine Mammal Exemption Certificates, but are required to report all interactions with marine mammals. The logbooks required under the pelagic longline fishery regulations include provisions for reporting interactions with marine mammals and thus facilitate compliance with the MMPA.

No special measures to prevent interactions with marine mammals area proposed in this amendment. Interactions are very rare and do not pose a management problem. The area closures imposed under Amendment 3 to the FMP to prevent taking of Hawaiian monk seals will remain in effect. In September, the Council requested that the Southwest Regional Director require observers to collect information on protected species interactions, as allowed through framework procedures in Amendment 3. Observers would provide data to confirm whether interactions occur more frequently than reported to date. If new information indicated that management action related to the protected species zone was needed, such actions would be possible through the framework procedures proposed in Amendment 7.

VIII.G Federalism (Executive Order 12612)

The proposed action will not have federalism implications sufficient to warrant preparation of a Federalism Assessment.

VIII.H National Environmental Protection Act (NEPA)

This amendment has been prepared to serve as a combined FMP amendment and final environmental impact statement (FEIS). As such, the format is somewhat different from the format of a stand-alone FEIS. This approach is taken to reduce the volume of paper required, and to reduce the potential for misunderstanding by ensuring that all reviewers have the same document. A listing of the sections in which information required for a FEIS follows the FEIS cover sheet.

IX. REVIEW OF COMMENTS AND RESPONSES TO COMMENTS

The Council and NMFS received many letters and petitions dealing with the management problems and the proposed and alternate actions being considered. A summary of these comments and responses to them follows.

IX.A Individuals' Comments on the Proposed Management Action and Alternatives

IX.A.1. Need for Limited Entry

Only one person indicated that there is no basis for limiting entry. This commenter indicated there are no clear biological problems, that the evidence does not indicate that the longline fishery is adversely affecting other fisheries, and that there is no limitation on international longline fisheries.

Response: The Council notes that evidence is not yet conclusive regarding whether there are or will be biological concerns with respect to fish stocks, but there is clear concern about the impacts of the fishery on sea turtles. The evidence is not yet conclusive regarding fishery interactions; more study is needed. The Council notes that the lack of international coordination may be a problem for future discussion.

IX.A.2. Supporting the Original Preferred Alternative

Letters and statements at hearings in support of the preferred alternative were received from 15 persons. In addition, petitions with more than 100 signatures were submitted in support of the preferred alternative. Among the points made were that:

- the ability to transfer permits is essential for business
- upgrading is critical to allow longline fishermen to fish with safe vessels on extended trips, especially with the main Hawaiian Island area closures in place
- the cap on number of vessels will minimize the risk of adverse effects on stocks and other fishery sectors
- transferable permits are crucial to allow new entry by persons who are now crew

Response: The Council notes that the proposed action differs from the preferred alternative principally in that there will be a limit on upgrading of vessels. The Council felt that allowing unlimited vessel upgrades might increase the risk of adverse impacts on turtles or fish stocks, so an upper limit on vessel length was proposed. However, permits will be freely transferable, and individual vessel owners will be able to make decisions whether or not to upgrade their vessels within the limits of the proposed upgrading rules. Thus permit holders will have more freedom than at present to use

their vessels and other financial resources in the manner that best suits their individual circumstances.

IX.A.3 Proposals for a More Restrictive Limited Entry Program

The Council received 14 sets of comments recommending that the original preferred alternative be made more restrictive:

- there is inadequate social impact evaluation
- the program does not consider the impact on native Hawaiians
- there is not sufficient evaluation and consideration of the value of recreational fishing
- the Council should be conservative and reduce the risk of adverse results of being wrong
- unlimited upgrades could result in collapse of the swordfish stock and ultimate fishery conflicts with other fishery sectors fishing closer to the islands for tuna
- the moratorium should be maintained until more information is available to demonstrate the effects of the longline fishery
- only those who fished in the moratorium should be eligible for new permits

Response: The proposed action is more conservative than the original preferred alternative. The limit on vessel upgrades should lessen the risk of adverse effects of being wrong about the expected impacts of a larger active longline fleet. While the number of vessels is the fishery will remained capped at no more than allowed during the moratorium, there may be more permits actively fished. Although the overall effort level is expected to increase somewhat compared to current levels, there may be a shift to swordfish fishing. The Council notes the importance of recreational fishing but has little information for determining the value of this fishery sector and does not expect it to be adversely affected by the longline fishery. Participation in the moratorium will be a criterion for permit eligibility, except that persons with small vessels and persons who qualify for longline limited entry by virtue of qualifying for lobster limited entry do not have to meet the landing requirement. This may result in some increase in effort as most current permit holders will make at least one trip to ensure future permit eligibility.

IX.B. Government Agencies' Comments

I.X.B.1. Hawaii Department of Business, Economic Development and Tourism

The Hawaii Department of Business, Economic Development and Tourism and the Hawaii State Senate Majority leader supported the preferred alternative. They indicated it would promote stability in the longline fishery. Transferability of permits

would make local businesses more viable and facilitate competitiveness with other world longline fisheries. Unlimited upgrades would also allow permit holders to obtain vessels and gear so they could best compete with other nations' longline fleets. There is no apparent risk to fish stocks.

Response: The Council chose to establish a limit on vessel upgrades. However, individual business owners will be able to decide whether to upgrade subject to the limits imposed. Whether the total harvest and value will be affected in the long run cannot be determined at this time but the fishery will be closely monitored and framework procedures can be used to adjust effort and/or catch upwards or downwards when more information becomes available.

IX.B.2 Office of Hawaiian Affairs and Department of Hawaiian Home Lands

The Office of Hawaiian Affairs and Department of Hawaiian Home Lands indicated concern that the program could adversely affect non-traditional and traditional native Hawaiian fishing practices. It was recommended that the program should provide special provisions for native Hawaiians, for example, reserving a limited number of permits for native Hawaiian fishermen.

Response: The Council is sensitive to the concerns of native Hawaiians and has worked for years to document and consider the needs of native Hawaiians in terms of fisheries under the Council's area of jurisdiction. The Council is unaware of any native Hawaiian fishing practices that will be affected in any way by the proposed action. The Magnuson Act does not provide a basis for special accommodations for native Hawaiians based on ethnic origin, therefore, no permits are reserved exclusively for native Hawaiians. However, permits will be transferable, and native Hawaiians will be able to enter the fishery if they choose to invest the necessary funds and other resources.

IX.B.3. US Department of State

The US Department of State recommended that the preferred alternative be modified to allow non-permitted U.S. longline vessels to enter Hawaii to reprovision. This would simply afford to U.S. vessels the same opportunity provided to foreign vessels.

Response: The proposed action now includes this measure. However, non-permitted longline vessels will not be permitted to offload any catch and may be required to stow or seal their gear while in the EEZ.

IX.B.4. US Coast Guard

The U.S. Coast Guard noted that, other things being equal, a larger vessel provides a greater margin of safety than smaller vessel. The Coast Guard did not, however,

propose that limitations on upgrading be removed on the basis of safety concerns.

Response: The proposed action will allow vessel owners to decide whether to upgrade their vessels for safety or other reasons.

IX.C. Comments on the DEIS and Responses

Several parties commented specifically from the perspective of review of the draft environmental impact statement in which the preferred alternative was presented and evaluated.

IX.C.1. Center for Marine Conservation

Comment: "The document glosses over the estimated take (and kill) of endangered and threatened sea turtles by simply noting the Council consulted with the NMFS, who issued a Biological Opinion with an Incidental Take Statement, including non-binding Conservation Recommendations."

Response: The Council had not had an opportunity to review and consider the Biological Opinion at the time the DEIS was being completed. The Council did discuss the Opinion at its meeting September 15-16, 1993, in the context of making final decisions on Amendment 7. Section III.G. of the final amendment document provides more detail on the Opinion and Incidental Take Statement. The Opinion is included as an Appendix to the final amendment/FEIS. Although the conservation recommendations and reasonable and prudent measures were directed at NMFS and not the Council, the Council took several actions to support the Opinion, including establishment of observer placement authority for the Southwest Regional Director, concurrence with immediate implementation of a vessel monitoring system, and limiting participation and vessel upgrades under a new limited entry program. This should prevent significant increases in potential fishing effort.

Comment: "There is no further analysis of the impact this increase (in effort) will have on sea turtle populations."

Response: Section VI.F. discusses the anticipated take of turtles under the proposed action.

Comment: "We also find NMFS' Biological Opinion lacking on this point, for the Incidental Take Level for the term of the Consultation (through December 31, 1993) allows for 752 takes with 299 mortalities. This take level is entirely excessive."

Response: NMFS concluded that the incidental take by the longline fishery in the 12 months covered by the Opinion could be 752 turtles, and that this take would not likely jeopardize the continued existence of the species.

Comment: "Without inclusion or summary of the Biological Opinion, the Terms and Conditions for implementing the Reasonable and Prudent Measures, and the proposed observer program, the DEIS document is inadequate for the purposes of public review and comment on the issue of endangered turtles."

Response: As indicated, the Opinion was not available to the Council prior to its decisions on the preferred alternative as described and evaluated in the draft amendment/DEIS. The final amendment/FEIS includes more information on the Opinion and actions taken to conform to the Opinion and Incidental Take Statement. The Opinion has been added as an appendix to the final amendment/FEIS.

Comment: "Furthermore, it appears that NMFS calculated the Incidental Take Levels for the Biological Opinion by simply looking at the estimated take from previous years and authorizing a similar take level in future years, or in this case, doubling the mortalities allowed to ensure no hindrances upon fishing activity for the current season. We find this methodology wholly inappropriate and believe it evades the spirit if not the letter of the Endangered Species Act. Because of the excessive incidental take authorized under the Biological Opinion, we request that the DEIS be revised to consider additional measures that can be imposed to reduce turtle mortalities."

Response: To determine the allowable take, NMFS first estimated the level of take that would be expected in the fishery by multiplying the estimated level of effort expected times the incidental take rate expected. NMFS then concluded that this level of take would not likely jeopardize the continued existence of the species if the take occurred in the next 12 months. NMFS then considered whether specific management measures could be applied to result in less turtle take in that period. NMFS did not recommend or require any such measures. Thus, the estimated level of take that resulted in the "no jeopardy" conclusion becomes the allowable take in the Incidental Take Statement. To the extent new information is available when consultations are reinitiated in June 1994, there could be a change in the allowable take in the future.

IX.C.2. U.S. Environmental Protection Agency

Comment: "Based on our overall review, we have assigned the DEIS a rating of **LO (Lack of Objections)**."

Response: None required.

"EPA commends the Council for its efforts to utilize ecosystem management techniques to protect commercial fish species. We do suggest that future EISs include all relevant studies such as the NMFS Biological Opinion so that other

agencies and the public have an opportunity to review and comment on all germane information before the decision is made."

Response: The Biological Opinion has been added as an appendix to the final amendment/FEIS, and section III.G. provides a summary of the conclusions of the Opinion.

IX.C.3. Marine Mammal Commission

Comment: "The results of the Section 7 consultations are not discussed in the DEIS and do not appear to be fully consistent with the proposed actions."

Response: The Biological Opinion was not available to the Council for consideration in the development of the draft amendment/DEIS, but is included as an appendix to the final amendment/FEIS and is summarized in section III.G. The conservation recommendations and reasonable and prudent measures were all directed at NMFS and not at the Council. As indicated in the response to the Center for Marine Conservation, the Council took several actions that are consistent with the Opinion and Incidental Take Statement.

Comment: "In particular, the preferred alternative relative to limiting fishing effort would permit increases in harvesting capacity that, as noted on page VI-44, would increase interaction rates with protected species, including sea turtles. This is directly contrary to the recommendation in the 10 June Biological Opinion that longline fishing be managed in a way 'that will not . . . result in increased sea turtle mortality.'"

Response: On 14 December 1993, the Council decided to propose a limited entry system with a limit on upgrading of vessels in the longline fleet. In addition, the Council agreed to immediate implementation of vessel monitoring system requirement and observer placement authority in September 1993. These actions are consistent with the Opinion.

Comment: "The MMC recommends that the DEIS be expanded to: (a) reflect the results of the Service's 10 June 1993 Biological Opinion and incidental take statement; (b) evaluate whether and what additional plan amendments may be needed to implement recommended actions contained in the Opinion and statement; and (c) where proposed actions are inconsistent with the recommended actions, provide the rationale for not adopting them."

Response: The Opinion is included as an appendix to the final amendment/FEIS and is summarized in III.G. The vessel upgrading limitation in the limited entry program, together with the vessel monitoring system requirement and observer authority, is consistent with the Opinion.

Comment: "In addition, the MMC recommends that the WPFMC's preferred alternative for limiting fishing effort be rejected in favor of the alternative described in section V.B.2 to extend limited entry regulations in their current form."

Response: The Council did not choose the original preferred option but chose a limited entry program with limits on vessel upgrading.

Comment: "The MMC recommends that the mandatory observer measures contained in the Draft Amendment be included in the proposal and implemented at the earliest possible date."

Response: The Council agreed in September 1993 to immediate implementation of observer placement authority for the Southwest Regional Director, and NMFS is promulgating regulations to implement a mandatory observer program as quickly as practicable.

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Appendix 1. Text of preamble and proposed regulations.

Billing Code: 3510-22

DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
50 CFR Part 685
[Docket No.]
RIN
Pelagic Fisheries of the Western Pacific Region

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Proposed rule.

SUMMARY: NOAA issues a proposed rule to implement a limited entry program for the Hawaii longline fishery through Amendment 7 to the Fishery Management Plan for the Pelagic Fisheries of the Western Pacific Region (FMP). This rule would replace a moratorium on the issuance of new permits for the Hawaii-based longline fishery for Pacific pelagic management unit species. Permits would be issued to people meeting eligibility criteria concerning participation in the longline fishery during the moratorium, the length of the longline vessel covered by a permit in the moratorium, or ownership of a limited entry permit for the Northwestern Hawaiian Islands lobster fishery. Approximately 166 vessels are expected to qualify for permits under this program. Permits would be transferable. No vessel larger than the largest vessel active in the moratorium (about 93 feet to date) could be registered for use with a limited entry permit. Non-permitted U.S. longline vessels could enter the exclusive economic zone (EEZ) in the Council's area of concern and ports shoreward of the EEZ with longline-caught fish on board provided the longline gear is stowed or secured. These vessels would not be allowed to off-load management unit species shoreward of the outer boundary of

the EEZ. The rule also proposes broad framework procedures for subsequent adjustment of the conservation and management measures for the pelagics fisheries. The definition of the protected species zone would be revised to correct a drafting error in the final rule that established the protected species zone). The definition of Optimum Yield would be revised to encompass fishing in waters outside the EEZ; this change would respond to concerns that vessels based in the region could impact, in waters outside the EEZ, certain fish stocks, other fisheries that depend on those stocks, or protected species. The proposed action is necessary to manage the longline fishery based in Hawaii to achieve optimum yield from the fishery and prevent overfishing in accordance with the Magnuson Fishery Conservation and Management Act (Magnuson Act).

DATES: Comments on the proposed rule will be accepted until [insert date 45 days after date of publication in the Federal Register].

ADDRESSES: Comments on the proposed rule may be sent to Gary Matlock, Acting Director, Southwest Region, National Marine Fisheries Service, 501 West Ocean Boulevard, Suite 4200, Long Beach, CA 90802-4213. Copies of the amendment, final environmental impact statement, and initial regulatory impact review are available from Kitty M. Simonds, Executive Director, Western Pacific Fishery Management Council, 1164 Bishop Street, Suite 1405, Honolulu, HI 96813, (808) 541-1974. Send comments on the proposed collection-of-information to the Director, Southwest Region, NMFS, 501 W. Ocean Blvd., Long Beach, CA 90802-4213, and to the Office of Information and Regulatory Affairs, Office of Management and Budget, ATTN: Paperwork Reduction Project 0648-0204, Washington, DC 20503.

FOR FURTHER INFORMATION CONTACT: Kitty M. Simonds, Western Pacific Fishery Management Council, at (808) 541-1974; Svein Fougner, Southwest Region, NMFS, at (310) 980-4034; or Alvin

Katekaru, Pacific Area Office, NMFS, at (808) 955-8831.

SUPPLEMENTARY INFORMATION: The FMP was prepared by the Council and approved and implemented by the Secretary of Commerce (Secretary) at a time when there were few problems in the domestic fisheries for management unit species (billfish and associated species). This is no longer the case. The longline fishery based in Hawaii targets swordfish, tuna, and other management unit species, often traveling up to 2000 miles from port. Due to rapid growth of this fishery, prior to imposition of the three-year moratorium on new participants, there was concern about the potential and actual impact of the expanded fishery on the status of some fish stocks, the impact of increased longline catches on other fisheries, and interactions between longline fishing and protected species such as Hawaiian monks seals and sea turtles.

The Council and Secretary have taken several actions to address these concerns. They established a control date for possible use in a limited entry program; adopted an FMP amendment establishing permit and logbook requirements for domestic longline and transshipping vessels using the fishery management area under the FMP; implemented an emergency rule and approved an FMP amendment to close certain waters around the Northwestern Hawaiian Islands (NWHI) to longline fishing to protect Hawaiian monk seals; implemented an emergency rule and approved an FMP amendment imposing a moratorium on new entry into the longline fishery based in Hawaii from April 1991 to April 1994; and implemented an emergency rule and approved an amendment to establish longline area closures around the main Hawaiian Islands to prevent gear conflicts. The reasons for these actions were described in considerable detail in the emergency rules published at 56 FR 14866 (April 12, 1991), 56 FR 15842 (April 18, 1991), 56 FR 28116 (June 19, 1991), 56 FR 28718 (June 24, 1991), and 56 FR 37300 (August 6, 1991), and in the proposed rules and final rules for Amendment 2 published at 55 FR 49285 (November 27, 1990) and 56 FR 24731 (May 31, 1991), respectively, in the proposed rules

and final rules for Amendment 3 published at 56 FR 37070 (August 2, 1991) and 56 FR 52214 (October 18, 1991), respectively, in the proposed and final rules for Amendment 4 published at 56 FR 41643 (August 22, 1991) and 56 FR 51849 (October 16, 1991), and in the proposed and final rules for Amendment 5 published at 56 FR 60961 (November 29, 1991) and 57 FR 7661 (March 4, 1992), respectively, and will not be repeated here. Amendment 7, which this rule would implement, replaces the moratorium on new entry into the Hawaii-based longline fishery. The moratorium expires on April 22, 1994.

This amendment addresses a number of concerns that are associated with the prospect of unregulated expansion of the longline fishery. A dramatically increased level of longline fishing catches from the portion of the EEZ around Hawaii and from adjacent high seas could result in a threat of overfishing of the stocks of Pacific pelagic management unit species throughout their range, most notably swordfish. Even if stocks were not affected on a stock-wide basis, dramatically increased catches by U.S. longline vessels could adversely affect established commercial and recreational handline and troll fisheries in the EEZ, as well as the longline fishery. Further, even if direct catch competition were not occurring, there could be considerable potential for market competition, both between the longline fleet and the troll and handline fleets and within the longline fishery itself. Unregulated expansion of the longline fishery could also increase the likelihood of adverse impacts on threatened and endangered species such as sea turtles which are known to be taken in the longline fishery.

On the other hand, the restrictions (e.g., limitations on permit transfers and on vessel upgrading) under the moratorium, in combination with area closures around the Northwestern and main Hawaiian Islands that were imposed after the moratorium went into effect, have been adversely affecting a number of people who had qualified for longline permits under the moratorium. More than a quarter of the eligible fleet was inactive in 1992, due in many cases to the main Hawaiian Island area closures that require

vessels to travel 50 to 75 or more miles from shore to set their longline gear. Some older and smaller vessels are unable to fish under these restrictions. Vessel owners have in some cases been unable to sell or otherwise transfer their vessels or obtain financing for their fishing activity due to the "one transfer" limit during the moratorium. In the Council's view, this has been an unintended negative effect of the management program. Further, restrictions on the longline fishery outside the EEZ could have mixed effects on the nation. The U.S.A. would benefit if the fishery could expand without adverse effects on fish stocks, other fisheries, or protected resources. In the absence of similar management of foreign fleets, restricting the U.S. fleet could disadvantage the U.S.A. in any future negotiations leading to international regulation of longline fisheries and allocations of fish from the high seas.

The FMP also could be improved administratively. Existing framework procedures for regulatory changes are limited in scope, and new framework procedures could expedite the implementation of new regulations without an FMP amendment. This is especially important for rapid response to new information indicating problems with respect to stock conservation or conservation of protected resources.

Under Amendment 7, Hawaii longline limited entry permits would be required for longline vessels to fish for or land or transship Pacific pelagic management unit species shoreward of the outer boundary of the EEZ around Hawaii. Longline general permits are required for longline fishing vessels to fish for or land or transship Pacific pelagic management unit species shoreward of the outer boundary of the EEZ around American Samoa, Guam, the Northern Mariana Islands, or other U.S. islands in the Pacific Ocean area. Vessels that are categorized as receiving vessels, i.e., do not have fishing gear on board but have management unit species on board, must have receiving vessel permits if they have longline-caught fish on board anywhere in the management area. A Hawaii longline limited entry permit holder may fish for or land Pacific pelagic management unit

species in all other areas in the western Pacific EEZ without obtaining a longline general permit.

The following people would be eligible for Hawaii longline limited entry permits: (i) the last holder of record for any longline vessel limited entry permit under the moratorium, provided the vessel was used to land longline-caught management unit species at least once during the moratorium period; (ii) the last holder of record of a limited entry permit under the moratorium for a vessel less than 40 feet in length; and (iii) the last holder of record of a limited entry permit obtained during the moratorium because that person also held a limited entry permit for the NWHI crustaceans (lobster) fishery.

Hawaii longline limited entry permits would be freely transferable among vessels, provided the new vessel is not longer than the longest vessel that had a longline permit and made landings during the moratorium period (about 93 feet to date). The vessel's length overall will be the measure of length used in making determinations of compliance with this restriction.

These measures are intended to relieve economic strains now faced by longline vessel owners in Hawaii due to present limitations on permit transfers and vessel upgrades. The measures are intended to allow vessel owners more freedom to either transfer their vessels or permits to other prospective fishery participants or invest in larger vessels (up to the size of the largest vessel active in the moratorium period) in order to resume operation in the fishery. Vessel owners will have more freedom to decide whether and how to use their vessels and other resources. This is expected to result in a decrease in the number of smaller vessels and an increase in the number of larger vessels. Overall effort is expected to increase, with more effort directed at swordfish on the high seas. Landings of swordfish and tuna are expected to increase, with the value of landings estimated to rise from about $44 million in 1992 to about $60 million per year after fleet adjustments have been made.

The amendment contains framework procedures to allow rapid

responses to changing conditions, including biological concerns for the stocks, economic problems in the fisheries, and potential harm to protected species such as sea turtles.

The rule also proposes to add three species to the management unit. This will ensure that collection of catch and effort data will be comprehensive.

In addition, the definition of protected species zone would be revised to correct a drafting error when the zone was created (56 FR 52214, October 18, 1991). The current definition leaves open to longline fishing a corridor between Laysan Island and Lisianski Island. The intent of the Council in establishing the protected species zone was to provide a continuous closed corridor around the northwestern Hawaiian Islands in which longline fishing would be prohibited to protect Hawaiian monk seals.

Classification

Section 304(a)(1)(D) of the Magnuson Act requires the Secretary to publish regulations proposed by a Council within 15 days of receipt of the amendment and regulations. At this time, the Secretary has not determined that Amendment 7 is consistent with the national standards, other provisions of the Magnuson Act, and other applicable law. In making that determination, the Secretary will take into account the data, views, and comments received during the comment period.

The Council prepared a combined final FMP amendment/Final Environmental Impact Statement (EIS) covering the impacts of the fishery as managed under this amendment and alternative approaches. The final amendment/final EIS is available from the Council (see "ADDRESSES").

This rule, if adopted, is expected to have a significant impact on a substantial number of small entities. Hawaii longline vessel operators will have more flexibility to buy and sell vessels and permits and to upgrade their fishing vessels to compete more effectively in the domestic longline fishery, as

well as with foreign fleets. It is estimated that total revenue from longline landings would increase to $60 million per year from about $43 million in 1992. The final amendment/FEIS includes a section with an Initial Regulatory Flexibility Analysis intended to satisfy the requirements of the Regulatory Flexibility Act.

This rule includes changes in an information collection previously approved by the Office of Management and Budget (OMB NO. 0648-0204). A request for approval of these modifications and extension of the collections is included in a request submitted by the Southwest Region, NMFS, for approval of modification and extension of that collection that covers all Southwest Region fishery permit programs. The proposed program would require prospective participants in the Hawaii longline fishery to submit permit application forms and supporting information, including a current Certificate of Documentation from the U.S. Coast Guard, to obtain a permit under the new limited entry program. Landings records from the existing Hawaii longline logbook reporting requirement will be used to determine whether an individual has met any landings requirement to qualify for a permit. The estimated burden on the applicants is 30 minutes per application. This is less than the average of one hour or more that had been required for applications for permits in the moratorium period because those applications often involved documentation demonstrating intent to enter the longline fishery at a time when investment decisions were made. The documentation requirements under the new permit program will be much simpler.

The Council assessed the potential impacts of the fishery, as it would operate under the proposed management program, on endangered and threatened species and concluded that the fishery is not likely to adversely affect any endangered or threatened species nor will it adversely affect any critical habitat of any listed species. A consultation under Section 7 of the ESA was conducted in 1993 and NMFS issued a Biological Opinion and Incidental Take Statement in June 1993 concerning the take of sea

turtles in the longline fishery. The Opinion concluded that the fishery, as managed by the FMP, is not likely to jeopardize the continued existence of the species during the one-year term of the Opinion. Several conservation recommendations and reasonable and prudent measures were included in the Opinion and Statement, which are in an Appendix to the amendment. Through complementary actions, the Council has also established a mandatory observer program and an electronic vessel monitoring system requirement for the longline fishery; these measures were also recommended in the Opinion and Statement). The Council has determined that the overall pelagic longline management program is consistent with the Endangered Species Act.

The proposed action does not contain policies with federalism implications sufficient to warrant a federalism assessment under E.O. 12612.

List of Subjects in 50 CFR Part 685

American Samoa, Fisheries, Fishing, Guam, Hawaiian Natives, Northern Mariana Islands.

Dated:

For the reasons set forth in the preamble, 50 CFR Part 685 is proposed to be amended as follows:

PART 685--PELAGIC FISHERIES OF THE WESTERN PACIFIC REGION

1. The authority citation for part 685 continues to read as follows:

Authority: 16 U.S.C. 1801 et seq.

2. In § 685.2, the definition of "Pacific pelagic management unit species" is revised by adding three species to the end of the list of species, the definition of "Protected Species Zone" is revised by revising the second sentence of the definition, the definition of "Substantial financial investment" is removed, and new definitions of "Council", "Fish dealer", "Fishery Management Division", "Hawaii longline limited entry permit", "Length overall", "Longline fishing vessel", "Longline general permit", "Moratorium", "Receiving vessel", and "Receiving vessel permit" are added in alphabetical order to read as follows:

§ 685.2 Definitions.

* * * * *

Council means the Western Pacific Regional Fishery Management Council that was established under section 302 of the Magnuson Act.

* * * * *

Fish dealer means any person who: (1) obtains, with the intention to resell, Pacific pelagic management unit species, or portions thereof, that were harvested or received by a vessel that holds a permit under this part or that is otherwise regulated under this part, or (2) provides recordkeeping, purchase, or sales assistance in obtaining or selling such management unit species (such as the services provided by a wholesale auction facility).

Fisheries Management Division (FMD) means the Chief, Fisheries Management Division, Southwest Regional Office, National Marine Fisheries Service, 501 W. Ocean Boulevard, Suite 4200, Long Beach, CA 90802, or a designee.

* * * * *

Hawaii longline limited entry permit means the permit required by § 685.9(a)(2) to use a vessel to fish for Pacific pelagic management unit species with longline gear in the EEZ or to land or transship longline-caught fish shoreward of the EEZ around Hawaii.

* * * * *

Length overall, or length, of a vessel means the length overall set forth in the Certificate of Documentation (CG-1270) issued by the U.S. Coast Guard for a documented vessel, or in a registration certificate issued by a state or the U.S. Coast Guard for an undocumented vessel. For vessels that do not have the length overall stated in an official document, or for a vessel for which NMFS requests confirmation of the length overall, the length overall is the horizontal distance, rounded to the nearest foot, between the foremost part of the stern and the aftermost part of the stern, excluding bowsprits, rudders, outboard motor brackets, and similar fittings or attachments (Figure 1).

* * * * *

Longline fishing vessel means a vessel that has longline gear on board the vessel.

* * * * *

Longline general permit means the permit required by § 685.9(a)(1) to use a vessel to fish for Pacific pelagic management unit species in the fishery management area excluding the EEZ around Hawaii, or to land or transship longline-caught fish shoreward of the outer boundary of the fishery management area excluding the waters shoreward of the EEZ around Hawaii.

* * * * *

Moratorium means the moratorium on new entry into the Hawaii longline fishery that was effective from April 23, 1991, through April 22, 1994, and was implemented by rules published at 56 FR 14866 (April 12, 1991), 56 FR 28116 (June 19, 1991), and 56 FR 51849 (October 16, 1991).

* * * * *

Pacific pelagic management unit species means the following fish:

Common name	Scientific name
* * *	
Moonfish (or opah)	Lampris spp.
Pomfret	Family Bramidae
Oilfish (or walu)	Family Gempylidae

* * * * *

Protected species zone means

* * *

Where the areas are not contiguous, parallel lines drawn tangent to and connecting those semicircles of the 50-nm areas that line between Nihoa Island and Necker Island, French Frigate Shoals and Gardner Pinnacles, Gardner Pinnacles and Maro Reef, Laysan Island and Lisianski Island, Lisianski Island and Pearl and Hermes Reef, shall delimit the remainder of the protected species zone.

Receiving vessel means a vessel of the United States of America that has on-board the vessel longline-caught Pacific pelagic management unit species but does not have longline fishing gear on board the vessel.

Receiving vessel permit means a permit required by § 685.9(a)(3) for a receiving vessel to transship or land Pacific pelagic management unit species in the fishery management area.

* * * * *

3. In § 685.4, paragraph (b) is revised to read as follows:

§ 685.4 Recordkeeping and reporting.

* * * * *

(b) The operator of any longline fishing vessel subject to § 685.9 must maintain on board the vessel an accurate and complete fishing logbook for each day of each fishing trip, which must include the following information:

* * * * *

4. In § 685.5, paragraphs (e), (f), (g) and (h) are revised and paragraphs (n), (o), (p), (q), and (y) are added to read as follows:

§685.5 Prohibitions.

* * * * *

(e) Use a longline vessel without a valid general longline permit or a Hawaii longline limited entry permit registered for use with that vessel, to fish for Pacific pelagic management unit species in the EEZ around American Samoa, Guam, the Northern Mariana Islands, or U.S. possessions in the Pacific Ocean area.

(f) Use a longline fishing vessel without a valid Hawaii longline limited entry permit registered for use with that vessel to fish for Pacific pelagic management unit species in the EEZ around Hawaii.

(g) Use a receiving vessel without a valid receiving vessel

permit registered for use with that vessel to land or transship, shoreward of the outer boundary of the EEZ around American Samoa, Guam, Hawaii, the Northern Mariana Islands, or U.S. possessions in the Pacific Ocean area, Pacific pelagic management unit species harvested with longline gear.

(h) Transfer a permit in violation of § 685.9(j).

* * * * *

(n) Refuse to make available to an authorized agent for inspection or copying any records that must be made available under § 685.17.

(o) To use a U.S. vessel that has longline gear on board and that does not have a valid Hawaii longline limited entry permit registered for use with that vessel or a valid longline general permit registered for use with that vessel to land or transship Pacific pelagic management unit species shoreward of the outer boundary of the EEZ around American Samoa, Guam, the Northern Mariana Islands, or U.S. possessions in the Pacific Ocean area.

(p) To use a U.S. vessel that has longline gear on board and that does not have a valid Hawaii longline limited entry permit registered for use with that vessel to land or transship Pacific pelagic management unit species shoreward of the outer boundary of the EEZ around Hawaii.

(q) For a U.S. vessel without a valid Hawaii longline limited entry permit registered for use with that vessel to enter the EEZ around Hawaii with longline gear that is not stowed or secured in accordance with § 685.26.

* * * * *

(y) For a U.S. vessel without a valid Hawaii longline limited entry permit registered for use with that vessel or a longline general permit registered for use with that vessel to enter the EEZ around American Samoa, Guam, the Northern Mariana

Islands, or U.S. possessions in the Pacific Ocean area with longline gear that is not stowed or secured in accordance with § 685.26.

5. Section 685.9 is removed and a new § 685.9 is added to read as follows:

§685.9 Permits.

(a) Permit requirements.

(1) A longline fishing vessel of the United States must be registered for use under a Hawaii limited entry permit or a longline general permit if that vessel:

(i) is used to fish for Pacific pelagic management unit species in the EEZ around American Samoa, Guam, the Northern Mariana Islands, or other U.S. island possessions in the Pacific Ocean; or

(ii) is used to land or transship Pacific pelagic management unit species, shoreward of the outer boundary of the EEZ around American Samoa, Guam, the Northern Mariana Islands, or other U.S. island possessions in the Pacific Ocean.

(2) A longline fishing vessel of the United States must be registered for use under a Hawaii limited entry permit if that vessel:

(i) is used to fish for Pacific pelagic management unit species in the EEZ around Hawaii; or

(ii) is used to land or transship Pacific pelagic management unit species shoreward of the outer boundary of the EEZ around Hawaii.

(3) A receiving vessel must be registered for use with a receiving vessel permit if that vessel is used to land or transship, shoreward of the outer boundary of the EEZ around American Samoa, Guam, Hawaii, the Northern Mariana Islands, or other U.S. possessions in the Pacific Ocean, Pacific pelagic management unit species that were harvested with longline gear.

(b) Eligibility for initial permits.

(1) Any person who is eligible to be the owner of a vessel

that is documented under U.S. law or is registered under the laws of a State is eligible for a longline general permit under paragraph (a)(1) of this section or for a receiving vessel permit under paragraph (a)(3) of this section.

(2) Any person who is eligible to be the owner of a vessel that is documented under U.S. law or is registered under the laws of a State is eligible for a Hawaii limited entry permit under paragraph (a)(2) of this section, provided that person on April 22, 1994:

(i) Holds a limited entry permit issued during the moratorium, and owns or owned a vessel that landed longline-caught management unit species at least once during the moratorium period, April 23, 1991 through April 22, 1994; or

(ii) Holds a limited entry permit issued during the 3-year moratorium for a vessel which is less than 40 feet in length; or

(iii) Holds a longline limited entry permit issued to that person because that person was the holder of a permit for the Northwestern Hawaiian Islands lobster fishery under 50 CFR 681.30.

(c) Application.

(1) An application for a permit under this section must be submitted on a Southwest Region Federal Fisheries Application form obtained from the Pacific Area Office containing all the necessary information, attachments, certification, signatures, and fees. In no case will oral or telephone applications be accepted.

(2) A vessel owner must submit an application for a permit to the Pacific Area Office at least 15 days before the desired effective date of the permit. If an incomplete or improperly completed application is filed, the applicant will be sent a notice of the deficiency. If the applicant fails to correct the deficiency within 30 days following the date of notification, the application will be considered abandoned.

(3) An application is complete when all required information, attachments, certifications, signatures, and fees have been received.

(d) Change in application information. Any change in information on the permit application form submitted under paragraph (c) of this section must be reported to the Pacific Area Office at least 10 days before the effective date of the change. Failure to report such changes may result in termination of the permit.

(e) Issuance. The FMD will issue a permit to any applicant who is determined to eligible for a permit under the appropriate paragraph of this section if the application is complete.

(f) Fees. A fee is charged for each permit application submitted under paragraph (a)(2) of this section. The amount of the fee is calculated in accordance with the procedures of the NOAA Finance Handbook for determining the administrative costs of each special product or service. The fee may not exceed such costs and is specified with each application form. The appropriate fee must accompany each application. Failure to pay the fee will preclude issuance of a limited entry permit.

(g) Expiration. Permits issued under this section remain valid for the period specified on the permit unless transferred, revoked, suspended, or modified under 15 CFR part 904.

(h) Renewal. An application for renewal of any permit issued under this section must be submitted to the Pacific Area Office in the same manner as described in paragraph (c) of this section.

(i) Replacement. Replacement permits may be issued, without charge, to replace lost or mutilated permits. An application for a replacement permit is not considered a new application.

(j) Transfer.

(1) A permit is valid only for the vessel for which it is registered. A permit not registered for use with a particular vessel may not be used.

(2) The owner of a Hawaii longline limited entry permit may apply to transfer (by sale, assignment, lease, bequest, barter, trade, gift, or other form of conveyance) the permit:

(i) to a different person for registration for use with the

same or another vessel; or

(ii) for registration for use with another U.S. vessel under the same ownership.

(3) An application for a permit transfer must be submitted to the Pacific Area Office in the same manner as described in paragraph (c) of this section.

(k) A permit will not be registered for use with a vessel that has a length overall that is greater than the length overall of the vessel with the greatest length overall that used longline gear to fish for or land Pacific pelagic management unit species under the moratorium.

6. Section 685.13 is revised to read as follows:

§ 685.13 Notification of landing and transshipment. The operator of a longline fishing vessel that is subject to the permit requirements § 685.9(a) or § 685.9(b) of this part shall contact the Pacific Area Office by telephone, at a number provided to permit holders, within 12 hours of the vessel's arrival at any port in Hawaii, Guam, American Samoa, the Northern Mariana Islands, or U.S. possessions in the Pacific Ocean area and report the name of the vessel, name of the vessel operator, and the date and time of each landing or transshipment of Pacific pelagic management unit species by the vessel since its previous report of landing and/or transshipment.

7. Section 685.15 is removed and a new § 685.15 is added to read as follows:

§ 685.15 Permit appeals.

(a) Except as provided in subpart D of 15 CFR part 904, any applicant for a permit or any permit owner may appeal the granting, denial, conditioning, suspension, or transfer of a permit or requested permit to the Regional Director. In order to be considered by the Regional Director, the appeal must be in

writing, must state the action(s) appealed, and the reasons therefor, and must be submitted within 30 days of the action(s) by the FMD. The appellant may request an informal hearing on the appeal.

(b) Upon receipt of an appeal authorized by this section, the Regional Director may request additional information as will allow action on the appeal. Upon receipt of sufficient information, the Regional Director will decide the appeal in accordance with the criteria set forth in this part and the Fishery Management Plan for Pelagic Fisheries of the Western Pacific Region, as appropriate, based upon information relative to the application on file at NMFS and the Council and any additional information available, the summary record kept of any hearing and the hearing officer's recommended decision, if any, as provided in paragraph (c) of this section, and such other considerations as deemed appropriate. The Regional Director will notify the appellant of the decision and the reasons therefor, in writing, normally within 30 days of the receipt of sufficient information, unless additional time is needed for a hearing.

(c) If a hearing is requested, or if the Regional Director determines that one is appropriate, the Regional Director may grant an informal hearing before a hearing officer designated for that purpose. Such a hearing normally shall be held no later than 30 days following receipt of the appeal unless the hearing officer extends the time for reasons deemed equitable. The appellant and, at the discretion of the hearing officer, other interested persons, may appear personally or be represented by counsel at the hearing and submit information and present arguments as determined appropriate by the hearing officer. Within 30 days of the last day of the hearing, the hearing officer shall recommend in writing a decision to the Regional Director.

(d) The Regional Director may adopt the hearing officer's recommended decision, in whole or in part, or may reject or modify it. In any event, the Regional Director will notify the appellant, and interested persons if any, of the decision, and

the reason(s) therefor, in writing, within 30 days of receipt of the hearing officer's recommended decision. The Regional Director's action shall constitute final Agency action for the purposes of the Administrative Procedure Act.

(e) Any time limit prescribed in this section may be extended for a period not to exceed 30 days by the Regional Director for good cause, either upon his or her own motion or upon written request from the appellant stating the reason(s) therefore.

8. A new §685.17 is added to read as follows:

§ 685.17 Availability of records for inspection. Any fish dealer shall provide an authorized officer access for inspecting and copying all records of fish purchases, sales, or other transactions involving fish taken or handled by vessels that have permits issued under this part or are otherwise subject to this part, including but not limited to information concerning:

(a) The name of the vessel involved in each transaction and the owner or operator of the vessel;

(b) The amount, number, and size of each species of fish involved in each transaction; and

(c) The price(s) paid by the buyer and proceeds to the seller in each transaction.

9. A new § 685.18 is added to subpart A to read as follows:

§ 685.18 Framework procedures.

(a) Introduction. New management measures may be added, through rulemaking, if new information demonstrates that there are biological, social, or economic concerns in the fishery. The following framework process allows for measures that may affect operation of the fisheries, gear restrictions, quotas, or reductions or increases in longline catch and/or effort if the information supports such a change. Additional information may

indicate the need for new management measures for other sectors of the fishery, such as harvest guidelines, permits for certain classes of vessels, or reporting requirements.

(b) Annual report. By June 30 of each year, the Council-appointed Pelagics Plan Team will prepare an annual report on fisheries in the fishery management area, containing the following:

(i) Fishery performance data;

(ii) Summary of recent research and survey results;

(iii) Habitat conditions and recent alterations;

(iv) Enforcement activities and problems;

(v) Administrative action (e.g., data collection and reporting, permits);

(vi) State and territorial management actions;

(vii) Assessment of need for Council action (including biological, economic, social, enforcement, administrative, and state/Federal needs, problems, and trends). Indications of potential problems warranting further investigation may be signaled by indicator criteria. These criteria could include, but are not limited to, important changes in: mean size of the catch of any species; estimated ratio of fishing mortality to natural mortality for any species; decline in catch per unit effort by any sector; ex-vessel revenue of any sector; relative proportions of gear in and around the EEZ; rate of entry/exit of fishermen in the fisheries; revenues for a significant percentage of any sector; total pelagic landings; species composition of the pelagic landings; research results; habitat or environmental conditions; or level of interactions between pelagic fishing operations and protected species in the EEZ or surrounding waters.

(vii) Recommendations for Council action; and

(viii) Estimated impacts of recommended action.

(2) Recommendations for management action. The annual report shall specify any recommendations made by the Pelagics Plan Team to the Council. Recommendations may cover actions suggested for Federal regulations, state/territorial action,

enforcement or administrative elements, and research and data collection. Recommendations will include an assessment of urgency and the effects of not taking action and will indicate whether changes involve existing measures, which may be changed under § 685.18(c), or new measures, which may be implemented under § 685.18(d).

(c) Procedure for changing established measures.

(1) Established measures are those that are or have been in place via rulemaking procedures for various sectors of the fisheries, including, but not limited to: general longline fishery permits; limited entry longline fishery permits; longline logbooks and other reporting requirements; longline area closures; longline gear marking requirements; and longline vessel size limits. The estimated and potential impacts of these measures have been evaluated in past FMP amendments and associated documents.

(2) The Council will identify problems that may warrant action. This may be through the annual report described in paragraph (b)(1) of this section, or a separate report from the Pelagics Plan Team, the Advisory Subpanel, Pelagics Review Board, Scientific and Statistical Committee, pelagic fishery sector, enforcement officials, NMFS or other sources. The Council will discuss at its next meeting whether changes to established conservation and management measures would resolve the problem. Notice to the public and news media preceding the meeting will indicate that the Council intends to discuss and possibly recommend regulatory adjustments through the framework process for established measures to address the issue or problem. The notice must summarize the issue(s) and the basis for recommending the measures being reviewed and would refer interested parties to the document(s) pertaining to the issue. Based on the discussions at the meeting, which could include participation by the Pelagics Plan Team, Advisory Subpanel, Pelagics Review Board, Scientific and Statistical Committee, or other Council organizations, the Council will decide whether to recommend action by the Regional Director. The Regional Director will be

asked to indicate any special concerns or objections to the possible actions being considered under the framework process and, if there are any concerns or objections, will be asked for ways to resolve them.

(3) If the Council decides to proceed, a document will be prepared describing the problem and the proposed regulatory adjustment to resolve it. The document will demonstrate how the adjustment is consistent with the purposes of the established measure and that the impacts had been addressed in the document supporting the original imposition of the measure. The document will be submitted to the Regional Director with a recommendation for action. The Council may indicate its intent that the recommendations are to be approved or disapproved as a single action.

(4) If the Regional Director approves the Council's recommendation, the Secretary, in accordance with the Administrative Procedure Act, may implement the change in an established measure by publishing a final rule, waiving advance notice and comment. This does not preclude the Secretary from deciding to provide additional opportunity for advance notice and comment, but contemplates that the Council process will satisfy the requirements of the Magnuson Act and Administrative Procedure Act. It is emphasized that established measures are measures that have been evaluated and applied in the past, and adjustments are meant to be consistent with the original intent of the measure and within the scope of analysis in previous documents supporting the existing measure.

(5) Nothing in this section limits the authority of the Secretary to take emergency action under section 305(e) of the Magnuson Act.

(d) Procedure for implementing new measures.

(1) New measures are those that have not been used before or measures that, while previously applied, would be applied to another fishing sector (e.g., non-longline pelagic fishery) or gear type for the first time. New measures may have been previously considered in a past FMP amendment or document, but

the specific impacts on the persons to whom the measures would newly apply have not been evaluated in the context of current conditions. Potential new measures include, but are not limited to: permit requirements for new fishery sectors; reporting requirements for a fishery sector other than longline fishing; effort limitations; quotas (for total catch or by species) including individual transferable quotas; fractional licensing; or bycatch limits.

(2) A Pelagics Plan Team report (annual report or an in-season report), input from advisors, or input from NMFS or other agencies will first bring attention to a problem or issue that needs to be addressed at the next Council meeting. In its notice announcing the meeting, the Council will summarize the concern or issue raised, the party that has raised the problem, and the extent to which it is a new problem or a problem that may require new management measures. The Council will seek to identify all interested persons and organizations and solicit their involvement in discussion and resolution of this problem through the Council process, and the Council meeting notice in the Federal Register will emphasize that this problem will be discussed and that proposed actions may result.

(3) The document presenting the problem to the attention of the Council will be distributed to all advisory bodies of the Council who have not yet received it, with a request for comments. The document also will be distributed to the Council's mailing list associated with the FMP to solicit inputs and to indicate the Council will take up action at the following meeting. The Council's chairperson may request the Council's Pelagics Standing Committee to discuss the issue and review the comments (if any) of the Pelagics Plan Team, Advisory Panel, Pelagics Review Board, or Scientific and Statistical Committee, and develop recommendations for Council action.

(4) At the meeting, the Council will consider the recommendations of its Pelagics Standing Committee, if any, and other Council organizations and will take comments from the public concerning the possible course of action. If the Council

agrees to proceed with further action under the framework process, the issue will be placed on the agenda for the following meeting. A document describing the issue, alternative ways to resolve the issue, the preferred action, and the anticipated impacts of the preferred action, will be prepared and distributed to the public with a request for comments. A notice will be published in the Federal Register summarizing the Council's deliberations and preferred action and indicating the time and place for the Council meeting to take final action.

(5) In its notice for the following meeting, the Council will indicate that the Council may take final action on the possible adjustment to regulations under this section. At the meeting, the Council will consider the comments received as a result of its solicitation of comments and take public comments during the meeting on the issue or problem. The Council will consider any new information presented or collected and analyzed during the comment period. The Regional Director will be provided a specific opportunity to indicate any objections or concerns about any or all components of the measures being considered. The Council then will decide whether to propose a new measure or measures under this section.

(6) If the Council decides to proceed, the Council will submit its proposal to the Regional Director for consideration with supporting rationale and an analysis of the estimated biological, economic and social impacts of the proposed actions. The Council may indicate its intent that all components of its recommendations be approved or disapproved as a single action.

(7) If the Regional Director concurs, the Secretary, in accordance with the Administrative Procedure Act, may implement the new measure by publishing a final rule, waiving advance notice and comment. Nothing in this procedure is intended to preclude the Secretary from deciding to provide additional opportunity for advance notice and comment in the Federal Register, but contemplates that the Council process (which includes two Council meetings with opportunity for public comment at each) will satisfy that requirement.

(8) If a new action is approved and implemented, future adjustments may be made under the procedure for established measures.

(9) Nothing in this section limits the authority of the Secretary to take emergency action under section 305(e) of the Magnuson Act.

10. In § 685.25, paragraphs (a)(1) and (f) are revised to read as follows:

§ 685.25 Exemptions for longline fishing prohibited area; procedures.

* * *

(1) Currently owns a Hawaii longline limited entry permit issued under this part and registered for use with his vessel;

* * *

(f) The Council will consider information provided by persons with Hawaii longline limited entry permits issued under this part who believe they have experienced extreme financial hardship resulting from the Hawaii longline area closure, and will consider recommendations of the Pelagic Advisory Review Board to assess whether exemptions under this section should continue to be allowed, and, if appropriate, revise the qualifying criteria in paragraph (a) of this section to permit additional exemptions.

* * * * *

11. Section 685.23 is removed and §§ 685.24, 685.25, and 685.26 are redesignated §§ 685.23, 685.24, and 685.25, respectively.

12. Redesignated § 685.25 is removed and a new § 685.25 is added to read as follows:

§ 685.25 Port privileges and transiting for unpermitted longline

vessels. A U.S. longline fishing vessel that does not have a permit under paragraph 685.9(a)(1) or 685.9(a)(2) may enter waters of the fishery management area with Pacific pelagic management unit species on board, but may not land or transship any management unit species on board the vessel. The vessel's longline gear must be stowed or secured so it is rendered unusable during the time the vessel is in those waters.

APPENDIX 2

RESEARCH NEEDS RELATED TO AMENDMENT 7 PROPOSED ACTIONS

A three year work plan for quantifying the effect of longline fishing effort on Hawaii's pelagic fisheries was drafted by the Pelagic Plan Monitoring Team (PMT) in November 1990. This plan was adopted by the Council in December 1990 when it decided to establish the current longline moratorium on additional entry of vessels in the Hawaii longline fishery. The goal of the planned work was to identify the level of fishing effort at which the net benefits to Hawaii's pelagic fisheries are maximized. The approach outlined was to quantify the relationship between local catches (production) and fishing effort, and to define the value of the production and the cost of the effort.

The plan was proposed as a logical approach to providing a rational, scientific basis for determining the optimal level of fishing effort in Hawaii's pelagic fisheries. A few activities included in the plan are part of National Marine Fisheries Service (NMFS) and the state of Hawaii Division of Aquatic Resources (HDAR) ongoing programs. However, this ongoing work is only a small proportion of the research specified in this work plan. Funds to complete the rest of the tasks require new funding. Some of this has recently become available through the 5 year Western Pacific Pelagic Research Program authorized by Congress in 1991.

In February 1992, the PMT re-examined the proposed plan and made modifications to address changes which have occurred in the fishery. Most of the research will require more time than originally estimated because the problems have grown more complex. For example, much of the longline fleet has changed operations to fish for swordfish, and the fleet has also been excluded from areas where most fishing used to occur. It is now estimated the work could be completed in 4 years. New elements have also been identified regarding assessment of the new fishery for swordfish, which cannot be addressed using historical data.

Description of the Approach

Although it may be true that locally caught pelagic fish constitute a small fraction of stocks that extend beyond the range of Hawaii's fisheries, the rate of replacement of fish within the local area is finite. A useful definition of local overfishing would be when the local rate of exploitation approaches the rate of fish replacement, and local yield approaches an asymptote (Sathiendrakumar and Tisdell 1987, Boggs 1991). Beyond this level, increases in effort may not result in an increase in catch. This becomes overfishing in the economic sense because the costs of increasing effort are not compensated for by the value of the yield. The relationships between yield (and its value) and fishing effort, together with the relationship between the cost of fishing

operations and effort, define an optimal level of fishing effort. This is the approach outlined in the plan. The simplest approach is to document whether or not catch has increased in proportion to effort, and if not, to use the decline in catch per unit effort to estimate the asymptotic level of yield.

The research plan was designed only to quantify the effect of local effort on yield in various Hawaii pelagic fisheries, and to define the economic value of the yield and the cost of effort in the Hawaii longline fishery. It is possible that other Hawaii pelagic fisheries will also require regulations to prevent economic overfishing. Defining optimal effort levels for other pelagic fisheries will require additional work.

Work Plan Outline

I. Develop local asymptotic yield models from catch and effort data

A. Use historical data to make projections of catch

1. Obtain area summaries of 1956-80 foreign longline data
2. Summarize domestic catch and effort by gear type and area
3. Standardize effort statistics from diverse gears/sources
4. Incorporate seasonal effects on local CPUE dynamics
5. Index catch against stock-wide CPUE, or other factors
6. Project indexed catch versus standardized effort by area
   a. For each pelagic fishery (gear type)
   b. For all pelagic fisheries combined (if possible)

B. Examine 1991-1993 (or later) data for evidence of asymptotic local yield (Relevant elements of A.2 and A.3 also apply to time data time series)

1. Check if catches differ significantly from projections
2. Check if CPUE by gear declines versus total effort (all gears)

C. Fit local asymptotic yield model for use in determining whether adjustments in limited entry program needed

1. Based on longline fishery alone
2. Based on all gear types (dependent on A6b and B2)

II. Test alternative hypotheses for Changes in CPUE

A. Check for stock-wide declines in abundance

1. Obtain 1991-1993 (or later) catch and effort data for a wider area (requires cooperation with foreign scientists)

2. Obtain a substitute measure of stock-wide CPUE (long-term research to develop fishery-independent methods of stock assessment)

B. Check for environmental influences on local availability

1. Look for significant, fishery-independent factors (fishery oceanography)

C. Examine 1987-1993 (or later) data for economic factors

1. Check if trip activity is endogenous to CPUE and price
2. Estimate production substitution rates between gears,
3. Employ a search model to examine the economics of vessel movement and vessel interaction

D. Use revised model to predict optimal level of fishing effort

1. Incorporated new factors into local asymptotic model
2. Model bio-economic parameters to establish limited entry participation values
3. Examine trade-offs of possible adjustments in conjunction with participants

III. Develop simulation models of local overfishing

A. Synthesize information on fish growth, movement, and mortality

B. Model fish turnover and exploitation by each gear type

C. Estimate local asymptotic yields based on fishery simulations

IV. Develop stock assessment of swordfish fishery

The estimated costs for this research is approximately $3.5 million.

APPENDIX 3

BIOLOGICAL OPINION RESULTING FROM ENDANGERED SPECIES ACT SECTION 7 CONSULTATION ON THE TAKE OF SEA TURTLES IN THE HAWAII LONGLINE FISHERY

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213
TEL (310) 980-4000; FAX (310) 980-4018

JUN 15 1993 F/SW033:ETN

Ms. Kitty Simonds
Executive Director
Western Pacific Regional
Fishery Management Council
1164 Bishop Street, Suite 1405
Honolulu, Hawaii 96813

Dear Kitty,

Enclosed is a copy of the biological opinion completed by the National Marine Fisheries Service (NMFS) pursuant to an internal consultation in which the higher than anticipated levels of incidental take of listed sea turtles in the pelagics longline fishery is addressed. NMFS reinitiated consultation on this fishery because the number of sea turtles authorized for incidental take in the May 1991, biological opinion for Amendment No. 2 to the Pelagics FMP had been exceeded.

In this recent opinion, NMFS determined that the longline fishery adversely affects green, leatherback, loggerhead, olive ridely, and hawksbill turtles. However, there is a great deal of uncertainty about the actual levels of incidental take and an observer program is needed to document the incidental capture of sea turtles and verify logbook data. NMFS has concluded that allowing the longline fishery to continue for 12 months while observer data is collected and analyzed will not likely jeopardize the continued existence of listed species.

NMFS will reinitiate consultation 12 months from the date of this biological opinion to review information from the observer program, to assess the effect of the incidental take on the sea turtle populations, and to determine whether additional protective measures need to be implemented.

Sincerely,

Gary Matlock, Ph.D.
Acting Regional Director

Enclosure

cc: F/PR - W. Fox
F/SW033 - E. Nitta

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
1335 East-West Highway
Silver Spring, MD 20910
THE DIRECTOR

JUN 10 1993

MEMORANDUM FOR: The Record

FROM: Nancy Foster
(Acting)

SUBJECT: Reinitiation of Endangered Species Act Section 7 Consultation Concerning the Impacts on Sea Turtles by the Fishery Management Plan for the Pelagic Fisheries of the Western Pacific Region.

The National Marine Fisheries Service (NMFS) reinitiated consultation under section 7 of the Endangered Species Act (ESA) for Hawaii longline fishing activities managed under the Fishery Management Plan for Pelagic Fisheries in the Western Pacific Region (Pelagics FMP), to address higher than anticipated levels of incidental take of listed sea turtles specified in the May 1991 biological opinion. Based on the attached biological opinion, NMFS has concluded that the activities of the Hawaii longline fishery are not likely to jeopardize the continued existence of listed species under the jurisdiction of NMFS for the 12 months the biological opinion is in effect.

However, NMFS concludes that the longline fishery adversely affects green, leatherback, loggerhead, olive ridley, and hawksbill turtles. Current estimates of incidental take, if accurate, may not be sustained by listed species on a continuing basis without the risk of jeopardizing their continued existence. In light of the uncertainties of the actual level of incidental take, NMFS finds that an observer program is required to document the incidental capture of sea turtles and to verify logbook data. NMFS may impose conservation measures in this fishery if the actual take of sea turtles is determined to be excessive.

NMFS will reinitiate ESA section 7 consultation no later than 12 months from the date of this biological opinion. At that time NMFS will assess the results of an observer program to measure the incidental capture of turtles in this fishery.

Attachment

THE ASSISTANT ADMINISTRATOR
FOR FISHERIES

Endangered Species Act

Section 7 Consultation

Biological Opinion

Agency: National Marine Fisheries Service (NMFS)

Activity: Impacts of the Hawaii longline fishery on listed sea turtles.

Consultation Conducted By: National Marine Fisheries Service

Date of Issuance: JUN 10 1993

Background

In late 1990 the Western Pacific Regional Fishery Management Council (WPRFMC) requested initiation of consultation regarding a proposed amendment to the Fishery Management Plan for the Pelagic Fisheries of the Western Pacific Region (Pelagics FMP). This was to make permanent the emergency regulations promulgated for longline fishing under the Pelagics FMP in response to allegations of takings of endangered Hawaiian monk seals during longline fishing in proximity to certain islands and atolls of the NWHI and a rapid increase in the number of longline fishing vessels in Hawaii which relocated from unproductive fisheries on the east coast of the United States and the Gulf of Mexico. Consultation was completed and a Biological Opinion issued to the WPRFMC on May 15, 1991. NMFS found that operation of the pelagic longline fishery in proximity to the NWHI would likely jeopardize the continued existence of the endangered Hawaiian monk seal, and required a moratorium on longline fishing within 50 nautical miles of the islands and atolls of the NWHI. Adverse effects such as entanglement and mortality of green, leatherback, and olive ridley turtles were also identified but found not likely to jeopardize the continued existence of these populations.

In response to concerns regarding the rapid growth of the longline fishery, the absence of data on catch, effort, and the incidental takes of Hawaiian monk seals and other protected species in the pelagic longline fishery, the WPRFMC developed emergency regulations which were published by the NMFS in the Federal Register (55 FR 49285) on November 27, 1990, under the Pelagics FMP. These regulations implemented requirements for fishing logbooks, permits to fish with longline gear within the management area, and taking observers as requested when intending to fish within 50 nautical miles of French Frigate Shoals, Gardner Pinnacles, Laysan Island, Lisianski Island, Pearl and Hermes Reef, Midway Islands, and Kure Island. These emergency regulations expired on February 24, 1991, but were extended for an additional 90 days to May 25, 1991 (56 FR 5159, February 8, 1991).

The regulations implementing Amendment No. 2 to the Pelagics FMP became effective on May 26, 1991, and replaced the emergency regulations of November 27, 1990, with additional restrictions (56 FR 24731, May 31, 1991). The major change from the emergency regulations was codification of the authority of the Regional Director to modify the size of the study area around the islands and atolls from Kure to French Frigate Shoals.

The primary objective of the amendment was to increase the quality and quantity of data on the domestic longline fishery based in Hawaii. A second objective was to provide information on the incidence of interactions between listed species and the fishery and the level of impact to the affected populations.

The protected species study zone was closed to longline fishing through emergency rule (50 FR 15842, April 18, 1991) based on further reports of monk seals taken in the fishery. Regulations implementing a permanent closure under Amendment No. 3 were published on October 18, 1991 (56 FR 52214). Although the closure of the zone eliminated the observer requirement, Amendment No. 3 provided a mechanism for establishing observer programs as necessary for the fishery in other areas.

A review of 1991 longline logbook data and the Annual Report of the 1991 Western Pacific Longline Fishery (Southwest Fisheries Science Center, Honolulu Laboratory Administrative Report H-92-11) indicated an incidental take of listed sea turtles by the Hawaii-based longline fishery that exceeded the authorized annual take (25) provided in the May 1991 Biological Opinion. Analysis of the 1991 logbook data also indicated significant fishing effort outside of the U.S. EEZ around the Hawaiian Islands, a factor which was not considered in previous consultations for the Pelagics FMP.

Proposed Activities

NMFS is reinitiating consultation for Hawaii longline fishing activities managed under the Fishery Management Plan for Pelagic Fisheries in the Western Pacific Region (FMP), to address higher than anticipated level of incidental take of listed sea turtles specified in the May 1991 Biological Opinion.

Listed Species That May Occur in the Activity Area

Hawaiian monk seal (*Monachus schauinslandi*) - endangered
Green turtle (*Chelonia mydas*) - threatened
Leatherback turtle (*Dermochelys coriacea*) - endangered
Loggerhead turtle (*Caretta caretta*) - threatened
Hawksbill turtle (*Eretmochelys imbricata*) - endangered
Olive ridley turtle (*Lepidochelys olivacea*) - threatened

Sperm whale (Physeter macrocephalus) - endangered
Humpback whale (Megaptera novaeangliae) - endangered

Two additional species, the hawksbill turtle and loggerhead turtle, that are considered in this consultation were not covered in the May 1991 Biological Opinion. Summaries of the distribution and biology of these two species are provided below. The status of the other species has not changed since May 1991, and the information contained in the 1991 Biological Opinion is incorporated by reference.

Biology and Distribution of Species

Loggerhead Turtle

The loggerhead turtle is a cosmopolitan species found in temperate and subtropical waters. Nearly all nesting occurs north of 25° N or south of 25° S. Adult loggerheads undertake long reproductive migrations between their historical nesting sites and foraging areas. However, their dispersal patterns in foraging areas are not well known for any population.

In the North Pacific Ocean the only major nesting beaches are in the southern part of Japan (Dodd, 1988). Although reliable counts are not available, as many as 2,000-3,000 loggerhead turtles may nest annually on beaches throughout Japan. Immature loggerhead turtles encountered during driftnet fishing in the North Pacific Ocean may originate from nesting beaches in Japan, being transported to the north and east by the Kuroshio Current and its extension (Wetherall et al., in press). Loggerhead turtles reported taken in the Hawaii longline fishery may be of the same origin.

Hawksbill Turtle

The hawksbill turtle is commonly considered one of the most endangered species of marine turtles due to the long history of international commercial trade in tortoise shell. The hawksbill turtle occurs circum-globally and is the most tropical of all marine turtles. Hawksbill turtles are declining throughout their range and there are former nesting grounds in the North Pacific where the species once occurred but occurs no longer.

Nesting is widespread, but sparse, in tropical regions worldwide; large nesting colonies are atypical. Following a long developmental period of perhaps more than 30 years, adult turtles forage in coral reef systems of the tropical Pacific. Sexually mature females migrate every two or three years between foraging and nesting grounds. Adult males also display some degree of ability for long distance movement (Eckert, 1993). In the

Pacific Ocean, with the exception of Australia, nesting does not occur in abundance (Groombridge and Luxmoor 1989).

Hawksbill turtles encountered in the North Pacific high seas driftnet fisheries and Hawaii longline fishery may originate from the scattered nesting sites to the southwest in the Hawaiian Islands (see Balazs et al. 1990), or from southern Japan, including the Ryukyu Islands, where hawksbill turtle nesting occurs as a rare event (Uchida and Nishiwaki, 1982, Kamezaki 1987, Teruya and Uchida 1988).

Impacts on Species Other Than From Commercial Fishing

All species of sea turtles incidentally taken in the Hawaii longline fishery are also in decline due to continued exploitation of nesting females and their eggs on nesting beaches, destruction of nesting beaches by development projects and marine pollution. The status of these species and an assessment of overall impacts is extensively reviewed in Eckert, (1993), which is incorporated by reference. For example, in Malaysia and Mexico, the principal nesting areas for leatherback turtles, turtles that once arrived at nesting beaches in the tens of thousands annually, now arrive in tens or at most hundreds annually (Eckert, pers. comm, 1993). The collapse was precipitated by a tremendous overharvest of eggs coupled with the incidental killing at sea. In Mexico, much of the killing of turtles and taking of eggs has been reduced. However, little is being done to limit the killing of the turtles away from nesting grounds.

Potential Impacts on Species

The Endangered Species Act of 1973, as amended (ESA), prohibits the taking of endangered species except under limited circumstances. These include, but are not limited to scientific research under permit, actions taken by NMFS or U.S. Fish and Wildlife Service (FWS) personnel to salvage or rescue a stranded or distressed endangered animal, and take allowed under a Biological Opinion for a specific activity that has been reviewed under Section 7 of the ESA. Although annual levels of incidental take of listed sea turtles were specified in the original Biological Opinion for the Pelagics FMP, and in the Biological Opinion for Amendment No. 2 to the FMP, there was no allowable take for Hawaiian monk seals in either Opinion.

All fisheries in Hawaii are classified as Category III under the Marine Mammal Protection Act (57 FR 20328, May 12, 1992). These fisheries have been determined to have a remote likelihood of incidental takings of marine mammals. This does not mean that there are no interactions, only that marine mammals are not normally hooked, snagged, injured or killed during

fishing operations. Interaction incidents must be reported to the NMFS. Although incidental takes of Hawaiian monk seals occurred in the longline fishery in 1990 and 1991, closure of the protected species study zone in April 1991 appears to have eliminated interactions with the longline fleet, at least according to logbook data.

There are no confirmed incidents of sperm whale interactions with longline fishing gear in Hawaiian waters. One humpback whale was observed entangled in longline gear in 1991.

Incidental take of green, leatherback, and olive ridley turtles by longline vessels is documented from the central and western Pacific (Balazs 1982). Entanglement of green, hawksbill, and olive ridley turtles in lost and discarded fishing gear (monofilament net and line) in the central Pacific was also noted by Balazs (1984).

A leatherback turtle (Dermochelys coriacea) was found entangled in the main line of a lobster trap string near Kure Atoll in 1980. The turtle was released. Another leatherback turtle was hooked during experimental longline fishing for swordfish during a NMFS research cruise in the NWHI in 1991 and released alive, but with the hook ingested (Skillman and Balazs, 1992).

Nishemura and Nakahigashi (1990) estimated an incidental capture rate of 0.1 turtles/1,000 hooks for the Japanese tuna longline fishing fleet worldwide. Turtle mortality was estimated at 42% of turtles retrieved. Overall turtle take by the Japanese longline fleet in the Western Pacific and South China Sea was estimated at 21,200 with 12,296 retrieved dead annually. These estimates were based on commercial logbooks, research vessel data and a questionnaire distributed to research and training vessels which operate with longline and bottom trawl gear in locations which overlap with commercial fishing vessels.

Applying the rates of capture and mortality reported by Nishemura and Nakahigashi (1990), to the 1991 Hawaii longline fishing effort of 12,323,686 hooks, results in an estimated incidental take of approximately 1,232 turtles, with 517 mortalities.

Aguilar et al. (1992) estimated an annual incidental catch of more than 20,000 loggerhead turtles by the Spanish swordfish longline fleet (30-60 vessels) in the Mediterranean Sea based on two years of observer data and a survey of longline vessel skippers. The mean hook rate from observer data in July and August 1991 was nearly 4.5 turtles/1,000 hooks and corresponded to greatly increased fishing effort. Although there were no data presented on the number of turtles found dead, most of the turtles were released alive with the hook still lodged

internally. Mortality rates of 20 to 30 percent were calculated from observations of animals taken alive in the fishery and held in captivity. Bentivegna, et. al. (1993) reported that turtles that had ingested longline hooks and that were brought to the Naples Aquarium, rarely survived due to lodging of the hooks in the esophagus.

At the rate of 4.5 turtles captured/1,000 hooks, the Hawaii longline fleet is estimated to take approximately 55,457 turtles with up to 16,637 killed, based on reported 1991 effort of 12,323,686 hooks.

Witzell (1984) estimated the incidental take rate of sea turtles by the Japanese tuna longline fleet in the Atlantic U.S. and Gulf of Mexico EEZ for 1978-81 at 0.007 and 0.018 turtles/1,000 hooks respectively for the Japanese tuna longline fishing fleet. The estimates were based on tuna observers who collected turtle captures opportunistically and fishing logbooks. A total of 330 turtles (leatherback, green, Kemp's ridley, and loggerhead turtles) were estimated taken on 28,360,191 hooks over the four year period, a rate of one turtle per 86,000 hooks. The percentage of turtles released alive in both areas studied was 70.44% in the Atlantic and 93.3% in the Gulf of Mexico.

These wide ranges of incidental catch rates for these various fisheries are likely due to a number of factors. In the Spanish fishery seasonality and effort appear to influence catch rates greatly. The distribution and density of the various species of sea turtles are additional variables that will affect incidental catch rates for all fisheries. There is also likely a problem with species identification for green, loggerhead, olive ridley, and hawksbill turtles reported observed or taken in the logbooks for the Hawaii longline fishery. For example, position plots of green turtles taken in 1991 show only two within the Hawaii EEZ and most of the remainder (19) in the pelagic zone between 25° - 35°N and 160° - 170°W. Unless all of these reported green turtles were developmental juveniles ≤3 years old it would seem unlikely that all would have been green turtles, but more likely loggerhead turtles. For example, on one observer trip an olive ridley turtle was misidentified as a hawksbill by the skipper.

Post-release Mortality of Sea Turtles

The capture of sea turtles during longline fishing is of increasing concern worldwide. Many if not most of the turtles caught in this manner are still alive when brought on deck. However, evidence increasingly suggests that a large percentage of released turtles released in the longline fishery have received fatal injuries and will die within a short time.

Upon retrieval of turtles, captured incidentally, fishing line has often been reported extending well down the esophagus, with no hook visible. The usual practice is to cut the line as close to the mouth as possible and immediately release the turtle overboard. Although physically active when let go, the ultimate fate of these turtles, with the imbedded hook somewhere in the upper gastrointestinal (GI) tract, is questionable. The turtle upon release, will swim away and may live for days, weeks or months before dying.

Swallowing of the baited hook deep into the esophagus or stomach is the most probable manner of capture of turtles by the longline fishery. Unpublished studies on the esophageal pressure of sea turtles during the intake of food have shown that swallowing is facilitated by a powerful "hydraulic pump." When the esophagus relaxes, seawater along with the selected food is taken into the mouth and propelled down the esophagus. Once there, it is retained by esophageal papillae that are present in all species of sea turtles. Several forceful pumping cycles move the food along the esophagus into the stomach. Following each ingestion of seawater and food, a strong contraction of the esophagus expels the excess water. The result is separation of food from seawater. In the case of baited hooks, the "food" will usually be sucked in well past the horny structures of the mouth before the hook sets itself into soft tissue of the GI tract.

Perforation of the turtle's GI tract resulting from the hook's penetration could be expected to eventually result in both chemical and bacterial peritonitis and septicemia. However, another factor of potentially greater significance is that the turtle will struggle when reaching the limit of the attached line. The resulting stress on the GI tract would produce a damaging condition known as intussusception, or invagination (telescoping) of one segment of the GI tract into the other. Even greater stress would be expected to result when the fishing line is reeled in and any hooked turtle is dragged along through the water column and hoisted aboard. In addition to direct GI tract damage, all of the adjacent internal organs would be placed under stress that could result in hemorrhage.

At present there is sufficient cause for concern from a deductive logical appraisal of the situation, based on the limited information available. Without the benefit of comprehensive research to understand what happens to a sea turtle hooked by longline, the best available information suggests that 20-30 percent of turtles released will die as a result of their wounds (Aguilar et al., 1992).

Authorized Incidental Take - 1991

NMFS estimated the incidental take of sea turtles and associated mortality for projected Hawaii longline fishing effort in 1991 as part of the consultation under section 7 of the Endangered Species Act (NMFS, 1991). Incidental catch and mortality was calculated based on the capture rates reported by Witzell (1984) for the Gulf of Mexico (.018 turtles/1,000 hooks), observed mortality of 29.6 per cent for the Atlantic, and projected longline fishing effort within the NWHI study zones of 1,400,000 hooks/year. The level of incidental take authorized for the Hawaii longline fishery in 1991 was 25 sea turtles including one (1) mortality each of leatherback, olive ridley, and green turtles (NMFS, 1991). This authorized take assumed that all turtles released alive survived, an assumption that is no longer valid. Reports of logbooks and observers (discussed below) showed that incidental take levels were well in excess of those authorized.

The 1991 authorized incidental take level and calculation of estimated total mortality was determined to be too low primarily because longline fishing effort was 8.8 times greater than anticipated. The actual annual fishing effort was estimated at 12,323,686 hooks, while only 1,400,000 hooks/year were anticipated. Using the same capture and mortality rates used in the 1991 biological opinion (NMFS, 1991) yields an annual incidental take of 222 turtles with 44 turtles retrieved dead.

Reported Incidental Take - 1991

Total longline fishing effort for all areas (MHI, NWHI, inside Hawaii EEZ, and outside Hawaii EEZ) for the year as reported by logbooks was 1,681 trips by 140 vessels with total effort represented by 12,323,686 hooks. Of the 140 vessels that submitted logbooks only 24 vessels reported interactions with sea turtles. There were 61 total incidental takes including 3 mortalities and 1 injury of sea turtles reported in the longline logbooks for 1991.

Using this number of reported captures, one can estimate an incidental take rate of .005 turtles/1,000 hooks, and an observed mortality rate of .0002 turtles/1,000 hooks, based on reported 1991 effort of 12,323,686 hooks.

Under-reporting and non-reporting of incidental catches must be considered when assessing these reported incidental take and mortality rates. As an indicator of logbook accuracy, a sample of logs from 1991 were compared to landings data (market and auction receipts) and only 47% of the logbooks submitted to NMFS were considered acceptable. The inaccuracies included misidentification of fish species and underlogging or non-reporting of catch. In 1992, the percentage of acceptable

logbooks reporting fish landings had risen to near 80%. However, while the accuracy of reports of fish landed can be readily verified when vessels return to port, the take of protected species cannot be verified except by on-board observers.

NMFS made a limited effort to document the capture of protected species in 1992, when longline fishermen were permitted to fish within the NWHI Study Zone. Eleven trips on longline vessels were observed between July 1990 and March 1992. Total fishing effort for these 11 trips included 109 sets and 81,478 hooks. Incidental takes of sea turtles were observed on 3 of the 11 trips. Three leatherback turtles were entangled and released, and two olive ridley turtles were caught on baited hooks, one of which was released alive and the other retrieved dead. Although the sample size is small and the variance likely very high, the incidental take rate estimated from these trips is 0.061 turtles/1,000 hooks with an estimated mortality rate of 0.012 turtles/1,000 hooks.

Using these observed rates, the total projected incidental take of turtles in 1991 by the Hawaiian longline fishery is estimated to have been 752 turtles with 148 mortalities (turtles retrieved dead).

Critical Habitat

Critical habitat for humpback whales, sperm whales, green, leatherback, loggerhead, hawksbill and olive ridley turtles has not been designated or proposed within or near the FMP management area. The following areas have been designated as critical habitat for the Hawaiian monk seal in the NWHI (53 FR 18990, May 26, 1988): All beach areas, sand spits and islets, including all beach crest vegetation to its deepest extent inland, lagoon waters, inner reef waters, and ocean waters out to a depth of 20 fathoms around the islands and atolls of the NWHI including Nihoa, Necker, French Frigate Shoals, Gardner Pinnacles, Maro Reef, Laysan, Lisianski, Pearl and Hermes Reef, Midway (except for Sand Island and its harbor), and Kure.

Amending the incidental take statement for potential sea turtle take associated with pelagic longline fishing governed under the Pelagics FMP, or requiring turtle conservation measures in this fishery will not affect critical habitat for the Hawaiian monk seal.

Cumulative Effects

"Cumulative effects" are those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation.

Japanese tuna longline fishing effort overlaps the area fished by the Hawaii longline fishery. The cumulative effect of the Japanese fishery on sea turtles in this area is highly detrimental, if reported estimates of take and mortality are accurate. Estimated annual take of turtles taken by the Japanese longline fleet in 1978 in the Western Pacific and South China Sea was 21,200 with 12,296 killed (Nishemura and Nakahigashi, 1990). The estimated take of turtles in the Japanese fishery was much higher then that reported or estimated in the Hawaiian longline fishery.

Foreign driftnet fishing in the North Pacific Ocean for squid and salmon has been occurring for the past 12-14 years and ceased at the end of 1992. Except for recent observer data there is virtually no information on the extent of incidental take of listed species during the early years of these fisheries. The cessation of commercial driftnet fishing will reduce the total incidental take of listed species from all commercial fishing in the North Pacific Ocean. However, nations involved in driftnet fishing and others have increasingly shifted to longline fishing worldwide.

Conclusions

Based on the available information, NMFS concludes that the Hawaii longline fishing activities conducted under the Pelagics FMP are not likely to jeopardize the continued existence of any threatened or endangered species under its jurisdiction during the 12 months this biological opinion is in effect. However, NMFS concludes that this fishery adversely affects leatherback, hawksbill, green, olive ridley and loggerhead sea turtles and that the authorized level of take established by this biological opinion may not likely be sustained by these species on a continuing basis without the risk of jeopardizing their continued existence.

Estimated incidental catch and mortality rates from the Hawaii longline fishery from very limited observer coverage indicate an annual potential incidental take of approximately 752 turtles and 148 observed mortalities for 1991. These estimates are based on 11 trips observed wherein five turtles were captured. The estimate is subject to error because of the small sampling effort and the associated high statistical variance. The estimates of take from logbooks submitted by Hawaii longline

fishermen show much lower numbers of takes (61), injury (1), and mortalities (3) for all of 1991. However, estimates based on fishermen's logbooks are subject to inaccuracies unless the reports can be verified, which was not the case for these reports.

By comparison, authorized incidental take levels by injury or mortality of sea turtles by the longline and drift gillnet fishery for swordfish in the Atlantic and Gulf of Mexico have been set at 22 individuals (NMFS, 1991). This level was established based on both observer and logbook data. However. because of the absence of observer-based data on incidental capture for the Hawaii longline fishery, a relatively high incidental take rate is established for a 12-month period during which more comprehensive information of any incidental take will be gathered.

In addition, the estimates of take by the Hawaii longline fishery do not take into account mortality of turtles released alive. Based on limited information discussed in this opinion, NMFS estimates that 25 percent of all turtles released alive will die of their wounds. Thus, with an estimate of 752 total turtles captured annually, 148 would be retrieved dead, and an additional 151 turtles would die after being released alive.

In light of the uncertainties of the actual level of incidental take, a take of 752 turtles is established for one year during which NMFS-approved observers, on-board longline vessels will document actual levels of incidental take and verify logbook data.

NMFS may impose conservation measures in this fishery, either under regulations implementing the Pelagics FMP, or under the Endangered Species Act, if the take of sea turtles in this fishery is determined to be excessive.

Conservation Recommendations

The following conservation recommendations are provided pursuant to Section 7(a)(1) of the ESA for developing management policies and regulations through the Pelagics FMP which would help in reducing adverse impacts to listed species in the central North Pacific Ocean.

The recommendations provided in the section 7 ESA consultation concerning the issuing of exemptions for commercial fishing operations under Section 114 of the MMPA (NMFS, 1989) are reiterated below, as well as additional measures to minimize the incidental take.

(1) NMFS should undertake research to determine the fate of turtles released alive after being incidentally caught in the Hawaii longline fishery, and thus more accurately estimate the impact of this fishery on listed turtles.

(2) NMFS should propose to the Western Pacific Fishery Management Council that it develop a plan amendment that would preclude increases in fishing effort until NMFS has determined that incidental sea turtle mortality has been managed at a level that will not preclude recovery and that increased fishing effort will not result in increased sea turtle mortality.

(3) NMFS should initiate discussions with the Department of State to lead to the exchange of data with other nations whose vessels fish with longline gear in the Pacific to determine the incidental take and mortality of sea turtles by time and area so these data can be used to assess the need for additional conservation measures on an international scale.

Statement Regarding Incidental Taking Pursuant to Section 7(b)(4) of the Endangered Species Act of 1973, as Amended

Section 7(b)(4) of the Endangered Species Act requires that when a proposed agency action is found to be consistent with section 7(a)(2) of the Act and the proposed action may incidentally take individuals of listed species, NMFS will issue a statement that specifies the impact (amount or extent) of such incidental taking. It also states that reasonable and prudent measures be provided that are necessary to minimize such impacts. Incidental taking by the Federal agency or applicant that complies with the reasonable and prudent measures of this statement is authorized and exempt from the taking prohibition of the ESA.

A marine mammal species or population stock which is listed as threatened or endangered under the ESA is, by definition, also considered depleted under the Marine Mammal Protection Act of 1972 (MMPA). The ESA allows takings of threatened and endangered marine mammals only if authorized by Section 101(a)(5) of the MMPA. However, Section 101(a)(5) does not apply to commercial fisheries and accordingly no takings of listed marine mammals by the longline fishery are authorized.

The available information indicates that incidental taking of listed sea turtles occurs in pelagic longline fisheries in the central north Pacific Ocean. All turtle species affected by fisheries governed under this amendment have been reported either entangled in gear or hooked on deployed gear. Data on the level of incidental take in these fisheries were generated by the reporting requirements of Amendment No. 2 to the Pelagics FMP.

On the basis of effort reported by logbook in the new domestic longline fishery in the central north Pacific Ocean, incidental take rates derived from very limited observer data, and the status and distribution of green, leatherback, olive ridley, loggerhead, and hawksbill turtles in the NWHI and central Pacific Ocean, the incidental take level of listed sea turtles for the Hawaii longline fishery throughout the activity area is authorized at 752 individuals. A take by injury or mortality (turtles retrieved dead) of 299 individuals is authorized. Injury is defined as turtles that are released still entangled with fishing gear and 25 percent of those turtles released alive where the swallowed hook was not retrieved and the fishing line was cut. NMFS assumes that 25 percent of turtles released in this manner will subsequently die as a result of swallowing the hook. This level includes any observed or estimated take by capture or injury or other manner; but no more than 150 leatherback turtles may be taken in a manner that is observed to result in mortality or serious injury.

If the authorized level of take is met or exceeded, if mortalities or serious injuries exceed the authorized levels, or if projections indicate excessive incidental taking, then consultation must be reinitiated, and turtle conservation measures may be imposed.

Reasonable and Prudent Measures

The following reasonable and prudent measures must be implemented to allow activities conducted under the Fishery Management Plan for the Pelagic Fisheries of the Western Pacific Region, to continue. These measures are necessary to monitor and minimize impacts on endangered and threatened sea turtles:

(1) NMFS shall establish a voluntary observer program in the Hawaii longline fishery no later than 30 days from the date of this biological opinion. Observer coverage of the longline fishing effort shall be sufficient to produce statistically significant results and to evaluate the accuracy of logbook data submitted for this fishery. Observers shall also collect information to facilitate understanding the dynamics of the interaction with sea turtles and other protected species.

(2) NMFS shall establish a mandatory observer program in the Hawaii longline fishery as soon as practicable. An automated vessel monitoring system shall be implemented as part of this program to verify the location of "non-observed" vessels and to help verify the accuracy of logbook reports. NMFS shall prepare a plan for this program, for submission to the Director, Office of Protected Resources. no later than 60 days from the date of this biological opinion.

(3) NMFS must evaluate observer information quarterly and other available information when available to determine whether the incidental take level should be modified or if other management measures need to be implemented to reduce the take. NMFS will impose appropriate conservation measures, either under regulations implementing the Pelagics FMP, or under the authority of the Endangered Species Act. Such actions may include area or seasonal closures, gear restrictions, gear modification requirements, fishing quotas, or limited entry.

(4) NMFS shall evaluate methods and experimental designs that can be utilized to determine the fate of turtles released alive after being incidentally caught in the Hawaii longline fishery. A report evaluating these experimental methods must be submitted to the Director, Office of Protected Resources by January 1, 1994.

(5) Any sea turtle incidentally taken must be handled with due care to prevent injury to live animals, observed for activity, resuscitated if necessary, and returned to the water, as provided in 50 CFR 227.72(e)(1)(i).

(6) Unless reinitiated earlier, consultation must be reinitiated no later than 12 months from the date of this Biological Opinion.

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SSC Discussion and Recommendations

NMFS Biological Opinion
Regarding Interactions between Longlines and Turtles

31 August 1993

(Note: This report and component recommendations were adopted by the Council at its 81st meeting on 16 September 1993.)

In June 1993, the NMFS issued a biological opinion and incidental take statement for the Pelagics Fishery Management Plan (FMP), regarding the interactions between Hawaii-based longline fishing operations and marine turtles. Because the opinion will guide the NMFS' management approach to this fishery, the Scientific & Statistical Committee (SSC) was asked to review the opinion and comment to the Council as to the scientific information and management recommendations contained in the biological opinion.

The SSC organized an *ad hoc* committee to review the opinion and develop recommendations for consideration by the full SSC. The committee was comprised of SSC members Paul Callaghan, Rick Deriso and John Hampton, as well as Jeffrey Miller of the Queensland Department of Environment and Heritage. The SSC invited Dr. Miller to attend because of his expertise in the field of marine turtle biology and ecology. The committee met in the Council office on 24 August 1993. The committee reviewed the literature cited in the biological opinion, as well as information from other sources. The SSC met at the NMFS Honolulu Laboratory from 25-27 August 1993. Paul Callaghan chaired both meetings.

Section 7 of the Endangered Species Act requires inter-agency consultation to ensure that federal activities will not threaten the continued existence of listed species. The Council requested Section 7 consultation at the time of Amendment 2 to the Pelagics FMP, which established permits, logbooks, and limited observer coverage for the Hawaii longline fishery. A biological opinion and its associated incidental take statement was issued in May 1991 that used turtle catch rates from the Atlantic and Gulf of Mexico longline fisheries, expanded to longline effort levels in the Northwestern Hawaiian Islands (NWHI) in 1991, to establish an allowable annual incidental capture of 25 turtles for the fishery, with an allowable mortality of one turtle per species. The original opinion noted that most fishing was, at that time, conducted near Hawaii, and made several management recommendations including: closing the area within 50 miles of the NWHI to protect monk seals, requiring vessel captains to attend seminars on protected species, investigating the effects of vessel lighting on green

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turtle hatchlings, and re-initiating the consultation process if the authorized incidental capture was exceeded.

The Council requested another consultation for Amendment 3 to the FMP, which established a NWHI protected species zone closed to longline fishing. The NMFS responded in June 1991 that the Council's actions were consistent with recommendations contained in the previous biological opinion.

The Hawaii longline fishery's incidental capture of marine turtles in 1992 exceeded the authorized level of 25, so the consultation process was re-initiated. In June 1993, the NMFS issued the latest biological opinion; this opinion stated that the longline fishery adversely affects turtles, but that continued fishing operations for 12 months would not threaten the continued existence of any species. The opinion noted that much of the longline fishing is now conducted far from the islands, that total 1992 fishing effort was greater than the NWHI effort level used in 1991 to calculate the original authorized incidental capture level, and that there is much uncertainty about actual rates of turtle interactions and fishing-induced mortality. The biological opinion also noted that marine turtles as a group are in decline due to many causes, including fishing. Information reported by fishermen in their federal logbooks appears to be adequate for fish catch and effort, but is of questionable value for assessing interactions with protected species. Based on limited data, the biological opinion estimated that the 1992 Hawaii longline fishery captured 752 turtles, that 148 were retrieved dead, and that another 151 died after being released alive. As a result, the biological opinion established an authorized incidental capture of 752 turtles (and associated mortality) for the next 12 months.

The SSC and its *ad hoc* committee reviewed the biological opinion and its supporting documents, and offer the following observations and recommendations for consideration by the Council.

There is little information on turtle interaction rates and resultant mortality, especially within the area fished by Hawaii longliners, and at the species level. There is little confidence in published capture rates and observations such as the relative occurrence of hook ingestion and resulting mortality. The impact of the Hawaii longline fishery on marine turtle populations is unclear. We do know that the fishery captures several species of turtles and that some turtles die as a result. There are many other sources of turtle mortality, including other fishing gear types (e.g., trawls and gillnets) that have a turtle bycatch, with potentially higher levels of mortality than pelagic longlines. In assessing the impact of the fishery, one must remember that there is no evidence of density-dependant changes in turtle populations (i.e., unlike the case with some fish species, there is no evidence that increased mortality on adult marine turtles has resulted in increased population growth).

The use of observers will provide the necessary information to estimate turtle captures and mortality which, in turn, will lead to better-informed management decisions. However, it is impossible to assess turtle populations or the impact of fishery interactions on those populations through observer programs alone. Additional information on growth rates, survivorship, longevity, fecundity, etc., is also required to complete these assessments.

Extrapolations from data collected elsewhere that are presented in the biological opinion must be viewed with caution. This includes extrapolations from observer data collected in the NWHI protected species study zone, a relatively nearshore area where turtle densities and interactions may be higher. Interaction rates and mortality estimates vary widely around the world, and it is tenuous to make management recommendations based on extrapolations. However, the fact that we do not have this critical information does not mean that the issue should be ignored. The use of data from other sources is warranted until locally-generated data provide management guidance. The Council is sensitive to the issue of protected species, and has demonstrated its desire to work with the NMFS and the fishing community to develop and maintain a viable fishery, while conserving protected resources. However, given the paucity of relevant data, it is extremely difficult to estimate an allowable turtle take with any confidence.

The SSC offers the following comments on the conservation recommendations contained in the biological opinion and the reasonable and prudent measures in the incidental take statement.

NMFS Conservation Recommendation 1: The biological opinion recommends research to determine the fate of turtles released alive after being incidentally caught.

The SSC believes that the NMFS should undertake broader research on turtles to get as much information as possible on those incidentally caught. Knowing their fate after release is only one aspect of the information needed to properly manage these interactions (see below).

- **The SSC recommends that the NMFS expand the scope of this recommendation. (See comments on NMFS Reasonable and Prudent Recommendation 4, below).**

NMFS Conservation Recommendation 2: The biological opinion wishes the Council to develop a plan amendment that precludes an increase in longline harvesting effort. The biological opinion states that this harvesting cap would remain in place until the NMFS determines that incidental turtle mortality has been managed at a level that will not preclude recovery.

The SSC believes that proving this negative is an impossible scientific endeavor. Even to determine that turtle population recovery is likely at any given level of incidental mortality by longliners would require much more detailed information on turtle population dynamics (including other sources of mortality); these data will not be available in the short term. The SSC understands that NMFS Recommendation 2 is contrary to the Council's desire to allow vessel owners in the limited entry program to upgrade their vessels without restriction. The SSC understands that the preferred alternative in Amendment 7 will cap the number of vessels at the current limit of 166. The preferred alternative in Amendment 7 might lead to some increase in the number of vessels actively fishing, and may also lead to an increase in harvesting effort by some vessels. However, the SSC believes that NMFS Recommendation 2 would be extremely difficult to administer and enforce, and that trying to cap effort (beyond the cap on vessels proposed in the preferred alternative of Amendment 7)

is not justified by the available data. The NMFS recommendation implies that capping effort at current levels is a solution to turtle mortality, but other factors such as natural and seasonal variations in catchability, distribution, etc., influence interactions to an unknown degree. A 12-month limit on harvesting effort is unlikely to have any significant impact on cumulative turtle captures or mortality.

- **The SSC recommends the Council to proceed with its preferred alternative as described in the 1 July 1993 version of proposed Amendment 7. This preferred alternative includes the current limit of 166 vessels, an allowance for vessel owners to transfer permits freely and upgrade vessel size and harvesting abilities, a provision for mandatory observers, and a framework mechanism that will allow the Council to adjust effort, harvest, or turtle take, if necessary.**

  (Note: After initially adopting the above recommendation, the Council subsequently overturned it when taking final action on Amendment 7.)

NMFS Conservation Recommendation 3: The NMFS proposes to work with other countries to exchange data on interactions between fisheries and turtles.

- **The SSC recommends that the Council request substantive information on incidental turtle captures by species. Species-specific data are critical to management decisions, but are lacking in many existing data sets.**

NMFS Reasonable and Prudent Measures 1 and 2: The NMFS proposes to establish an observer program, first voluntary, then mandatory.

The SSC believes that an observer program can provide essential information on turtle interactions. The observer program must be based on a sound experimental design, and should be integrated with the larger goal of characterizing the fisheries and interactions with protected species, as well as an improved assessment of turtle populations. In addition to well-trained observers operating under a good plan, educating all members of the fishing community is essential for resolving the turtle issue.

- **The SSC recommends that a NMFS observer program be established as soon as practicable, and urges the SSC and Council to assist the NMFS in ensuring that the observer program is successful. To be successful in obtaining essential information for reducing the negative impacts on turtles by longline fishing, it is imperative that the observers collect information on turtle species, size, sex, hook location on/in turtle's body, capture location (area, date, depth and time), bait used, and for turtles that are dead, collect stomach contents, tissue samples (muscle, fat, liver), tumors and blood, for examination of mtDNA, toxins and heavy metals. The genetic analyses will provide information on turtle population inter-relationships, which is essential for cooperative international management.**

- **The SSC also recommends that the Council and NMFS include the longline fishing community in the development of the observer program as early as**

possible to create a valuable partnership and ensure the program's success. This includes on-going training of both captains and crew members.

The biological opinion would also require an automated vessel monitoring system (VMS) on longline vessels, in addition to observers.

The SSC understands that a VMS would allow spatially-stratified expansion of observer information on turtle bycatch to the total fleet. However, such expansions can also be performed using federal logbook data, assuming that fishing location and effort are reported accurately in the logbooks. The SSC understands that the Council is moving forward with its initiative to require the use of a VMS on Hawaii longliners for the enforcement of area closures. The biological opinion proposal to immediately link VMS requirements to the observer program makes the assumption that fishermen do not accurately report their fishing position, but the SSC believes that enforcement of locations reported in logbooks appears to be a weak justification for mandating fishermen to use this new and expensive technology. Logbook information is sufficient to construct a scientifically-valid expansion of the observer data.

- **The SSC recommends that the proposed requirement for a VMS be removed from the NMFS management recommendations so that the Council, NMFS, and Coast Guard may continue to develop VMS requirements for the longline fishery in an orderly and deliberate manner.**

NMFS Reasonable and Prudent Measure 3: The NMFS intends to monitor observer information quarterly to determine the need to modify the authorized incidental capture, or to take other management action.

As worded, the recommendation appears to allow quarterly adjustment of the incidental take statement.

- **The SSC believes that, rather than quarterly modification of the authorized take, a more appropriate action would be to activate the framework management mechanism established by Amendment 7 to control fishing effort, harvest, or possibly use other means to reduce turtle mortality (e.g., changes in fishing activity or gear configuration).**

- **The SSC recommends that the NMFS, in assessing the impact of incidentally-caught turtles, also consider information on other sources of marine turtle mortality, including debris entanglement and ingestion, interactions with other gear types, directed fisheries for turtles and their eggs, habitat destruction, etc., in order to more fully understand the relative and cumulative impacts on turtle populations.**

NMFS Reasonable and Prudent Measure 4: The NMFS proposed to evaluate ways to determine the fate of released turtles.

The SSC suggests that 1 January 1994 appears to be an impossible deadline to develop and assess such methods.

- **The SSC recommends that, in addition to evaluating existing methods, the NMFS should also look into developing new methods reducing interactions and determining the fate of released turtles. This initiative should be closely linked to the observer program.**

- **The SSC further recommends that our understanding of the fate of released turtles would be expanded by training observers in tag and release methods, and other related techniques, so that all turtles released can potentially provide useful information.**

NMFS Reasonable and Prudent Measure 5: This recommendation reiterates the federal requirements to handle turtles carefully, and to resuscitate them if necessary.

Some of the existing requirements, however, appear to be contrary to rational methods for handling sea turtles.

- **The SSC recommends that the NMFS and Council review the federal regulations (in 50 CFR 227.72) on handling turtles and revise them, as needed.**

- **In addition, guidelines should be developed for observers who handle turtles that are seriously injured. Presently, federal regulations require the release of all living turtles, but injured animals might survive better if taken to shore and treated.**

NMFS Reasonable and Prudent Measure 6: The NMFS intends to re-initiate consultation on this issue within 12 months.

The SSC understands the legal basis for this, but stresses that the available data on turtle interactions should be reviewed on an ongoing basis so that potential problems can be dealt with in a prudent and appropriate manner.

- **The SSC stresses that the conservation of turtles is important, and recommends that the NMFS continually analyze the observer results, and provide quarterly reports to the SSC and Council so that potential interactions can be addressed appropriately.**

The SSC believes that the biological opinion would have been better written in a more complete and objective manner. In future documents of this nature, the SSC urges the NMFS to provide tables of relevant data to support the conclusions, which will facilitate review and comparison of the information.

APPENDIX 5
EXAMPLES OF "NEW MEASURES" UNDER THE FRAMEWORK PROCEDURES

A number of adjustment mechanisms could be established as "new measures", or possibly "controversial measures" to adjust the effective effort in the fisheries. These include but are not limited to the following:

Fractional licenses: This is a relatively new variation on the use of limited entry permits in a fishery such that market mechanisms determine who will participate in a fishery under different levels of effort. This approach involves setting an initial limit on the units to be allowed in a fishery or fishery sector and adjusting it over time in response to changing stock or economic conditions. For example, an initial limit of 100 "participation units" (e.g., vessel years) might be permitted in a fishery initially, with one unit assigned to each of the 100 vessels then in the fleet. Assume it is subsequently determined that, due to stock declines, catch competition or economic problems, the limit should be reduced to 75 units. Each holder of an original unit would then be established to be worth 0.75 of a participation unit, but it would take a full participation unit to participate in the fishery. It would then be anticipated that participants in the fishery would buy and sell (or lease) fractional participation units with the ultimate effect of reducing the fleet to 75 units. The holders of the original units would try to maximize their respective incomes from either participating in the fishery (buying shares of participation units) or from selling or leasing their shares to others. On the other hand, two years later, it might be found that the allowable number of units could increase to 125, or 1.25 times as many units as originally allowed. Each original unit would then become "worth" 1.25 units. Again, a market would likely develop in which persons would buy, sell, and lease participation unit shares in order to maximize their respective incomes. The advantages of this approach are that (a) it allows for adjusting effort up and down in response to changing fishery conditions and additional information and (b) it allows market forces to determine exactly who participates rather than government dictates and judgments. New entry can be accommodated in the same manner.

Specialized permits: Another adjustment mechanism could be through the use of different types of permits. If, for example, the Council wanted to allow some initial expansion of effort they might issue provisional permits, which might be restricted in their area of use or duration. Permit holders would be informed upon issuance that if effort reduction was needed in the future, these permits would be the first to be reduced. This reduction could be accomplished in a number of ways, such as not renewing these limited duration permits or limiting continued participation to permit holders with the most number of points based on specified performance criteria (e.g., length of participation, harvesting history, etc).

Consolidation of Permits: The Council could also develop a mechanism which would both allow increases in harvesting capacity and reduce the number of permits. A fisherman could be permitted to buy more than one permit and consolidate them into one permit to be used with a vessel with greater harvesting capacity.

Individual Transferable Quotas: Under an ITQ system, each participant is assigned an ownership "share" of a total allowable catch (TAC) for a fishery. This share could be based on historic participation and landings, or other criteria. Once a TAC is set for the entire fishery, each participant's share, would translate into a portion of the TAC. The participant would be free to determine when to fish for this share, or even whether to sell or lease that share for the year. This allows a market to be established in which prospective participants determine, based on individual circumstances, whether they are more likely to maximize their personal benefits by fishing or not fishing, and if they decide to fish, they can decide to fish at a specific time of the year. By making shares transferable, ownership should eventually rest with the most efficient harvesters, since they will be best able to pay the highest price to obtain TAC shares, thus economic efficiency is likely to result. This also should help reduce or eliminate the "derby fishery" that often arises when a quota is set for a year with all participants trying to maximize their share of the quota in a first-come, first-served race. Markets can be more stable and there is less likelihood of quality problems, waste, and fishing under unsafe or sub-optimal conditions.

APPENDIX 6

PREDICTED CHANGES IN LONGLINE HARVESTS FOR 25 DIFFERENT ALTERNATIVES

Before the Council made its selection of a preferred alternative in April 1993, the spreadsheet simulation model described in Section VI.A.1 was used to predict changes in harvests of major pelagic species under 25 different scenarios.

As discussed previously, the implications of any given limited entry program varies depending on what decisions are made vis-a-vis the number of permits issued, the types of permits issued, whether permits are transferable and what rules govern the replacement of vessels. There are 24 different possible combinations of these four variables plus the open access situation.

2.1 Predicting the Size of the Fleet

The estimates presented below relied on predictions of fleet size, where available, resulting from the Transferability Assessment Workshop held in November 1992 (alternatives 2, 5, 8, and 11). In these cases, industry members of the working group were interviewed and asked to predict changes in the fleet under four different combinations of transferability and vessel upgrade options. The average of the responses was then used in the assessment as the projected number of active vessels expected under each of the original transfer and upgrade scenarios.

The Working Group considered only situations involving different transferability and fishing capacity upgrade options with the maximum number of permits to be issued fixed at 166, as in the original moratorium. For the dual permit options and the variable options, the simulator was rerun with the maximum number of A permits allowed to increase within the EEZ and with a second B class of permits for fishing outside the EEZ or exclusively landing swordfish. For the alterable permit options where participation would be allowed to increase, a maximum of 100 vessels was added but in the same proportion of medium and large size vessels as the comparable fixed vessels alternatives (i.e., no additional small vessels). One hundred vessels equals the number of new entrants into the fishery in the 5-year (1987-1991) period prior to the moratorium. For the open access option, the number of vessels in the fishery was set arbitrarily at 3 times the total number of active vessels in 1992.

2.2 Note on generation of catch estimates

The catch estimates for the 24 different scenarios are generated by the longline permit transferability simulator. The simulator calculates the number of annual number of fish caught inside and outside the MHI EEZ by the following algorithm:

Sum of:

$$CPUE_{ijk} * 1000\ Hooks/set_{jk} * Sets/year_{jk} * Boats_{k}$$

where subscript **i** represents species group (tuna, billfish, swordfish, other pelagics)

where subscript **j** represents Inside or Outside the MHI EEZ

where subscript **k** represents size of vessels (Small, medium, large)

CPUE is number of fish per 1000 hooks.

Table 6-1a summarizes the computations for **swordfish** catch in the Continued moratorium case (Fixed number of permits, No permit transfers, No upgrading).

The catch estimates have three basic permutations: "general" permits (whether fixed or variable) and two classes of "dual" permits (swordfish only and outside MHI EEZ only). First the general permit catch results are generated. Then the dual permit catch **supplements** are calculated. These are **added** to the general permit base case.

For Swordfish dual permits, CPUE for all other species groups is zeroed, and the number of boats is adjusted to the dual permit number. (The total number of additional boats is allocated to Medium and Large size categories by their proportion in the base case: 60/40). The simulator then calculates an "alternative" catch figure which is added to the base case. In the Swordfish case, the swordfish CPUE and number and location of sets per vessel remains the same as in the base case.

Using the Swordfish catch example from Table 3-1a, the simulator adds 0 Small boats, 36 Medium boats, and 24 Large boats. This generates the following additional swordfish catches: 3,434 Inside the EEZ, and 33,984 Outside the EEZ. Total Swordfish catch for the Swordfish dual permit is 8,834 (Inside) and 91,005 (Outside).

Table 6-1a. Example of **Swordfish** catch estimates from simulator

Case: Fixed number of permits
No permit transfers
No vessel up-grading

		Boat Size Category			
		SMALL	MEDIUM	LARGE	Sub-Total
IN EEZ	CPUE	0.31	1.78	2.91	
	HOOKS	1262	1146	1118	
	SETS	67	34	12	
	BOATS	15	48	43	106
	FISH	393.16	3,329.12	1,678.75	5,401.03
OUT EEZ	CPUE	2.42	7.49	11.91	
	HOOKS	1229	921	875	
	SETS	40	50	87	
	BOATS	15	48	43	106
	FISH	1,784.52	16,555.92	38,986.08	57,326.52
TOTAL	FISH	2,177.68	19,885.04	40,664.83	62,727.55

For the Out of MHI dual permits, Sets per vessel Inside the MHI EEZ is zeroed, and the Sets per vessel Outside is set at the minimum of (double the number of Out Sets in the base case or the sum of the number of In Sets and Out Sets in the base case). This becomes:

80 Out sets for Small longliners
84 Out sets for Medium-sized longliners
99 Out sets for Large longliners.

Using the Swordfish example, the following additional swordfish catches are generated: 0 Inside the EEZ, and 48,117 Outside the EEZ. Total Swordfish catch for the Out of MHI dual permit is 5,400 (Inside) and 105,138 (Outside).

Table 6-1b presents the calculations for these two cases. Derivation of dual permits figures from Fixed permit, No transferability, No up-grading case:

Table 6-1b. Derivation of dual permits expected landings from Fixed permit, No transferability , No up-grading case:

Catch (Number of Fish)

		Tuna	Marlins	Swordfish	Other
Base case (Fixed, No - No)	In EEZ	19,375	10,894	5,400	19,574
	Out EEZ	36,322	9,501	57,021	95,444
Swordfish Dual Permit -- Supplemental Catch	In EEZ	0	0	3,434	0
	Out EEZ	0	0	33,984	0
Total Catch	In EEZ	19,375	10,894	8,834	19,574
	Out EEZ	36,322	9,501	91,005	95,444
Out of MHI Dual Permit -- Supplemental Catch	In EEZ	0	0	0	0
	Out EEZ	30,235	7,476	48,117	79,769
Total Catch	In EEZ	19,375	10,894	5,400	19,574
	Out EEZ	66,557	16,977	105,138	175,213

6.3 Estimated changes in harvests by area and relative risks

The percent change in catches for marlins, swordfish, and tuna were computed for each of the 25 management alternatives (Table 6-2).

The relative risks of under-development, catch competition, market competition, and over-utilization were projected proportional to catch for each of the 25 management options (Table 6-3). The absolute risks of none of these factors are known. The relative risk of under-development is defined as the risk that a given alternative would result in harvests smaller than necessary to prevent over-utilization or overfishing compared to the other 25 alternatives. The other definitions follow similar reasoning.

3.4 Alternative Fleet Compositions for Preferred Alterative

The active fleet configuration in 1992 was 23 small, 60 medium and 40 large vessels. The fleet composition used for the impact assessment presented in Section VI for the Council's preferred alternative was 23 small, 86 medium and 57 large vessels (alternative "b" described below). All 166 permits issued were assumed to be active. The simulation model was also run with 3 other possible fleet compositions, all assuming that there would be no inactive permits. Table 6-4 and 6-5 show the predicted change in effort and change in harvest (numbers of fish) from the current situation under the four following fleet configurations:

A) the number of vessels in each size category increases proportionally to the current (1992) size composition (31/81/54);

B) the number of small longliners remains fixed at the current baseline but the number of medium and large vessels rises proportionally (23/86/57)

C) the number of small longliners is reduced to zero and the number of medium and large vessels rises proportionally (0/100/66);

D) all active longline vessels are large (0/0/166).

The range of changes in projected fishing effort from increasing the number of active longliners from 123 to 166 (an increase of 35%) is from +23 to 35% in effort in all areas and -54% to +35% in the main Hawaiian islands. Catch changes are more difficult to summarize since they vary by species as well as by area; the range is from a 58% decline in tuna catch in the MHI to a 153% increase in swordfish catch outside the EEZ.

Table 6-2. Impact of management options as percent change from current landings.

MANAGEMENT OPTION	A PERMITS	TRANSFER-ABILITY	UP-GRADE	B PERMITS	ACTIVE PERMITS A/B S/M/L	CAPTURE LOCATION	MARLINS %	SWORD-FISH %	TUNA %
1 (Open Access)	None	Open	Open	No	369 (23/208/138)	Any-where	162 141/190	234 223/235	184 140/208
2	Fixed 166	None--limited	No	No	106/-- 15/48/43	Total In/Out	-19 -23/-13	-5 -15/-4	-15 -23/-10
3				Outside EEZ	106/60 0/36/24	Total In/Out	11 -23/56	68 -15/77	31 -23/65
4				Sword-fish	106/60 0/36/24	Total In/Out	-19 -23/-13	52 40/53	-15 -23/-10
5	Fixed 166	None--limited	Yes	No	128/-- 16/58/54	Total In/Out	-4 -11/5	17 4/19	2 -11/9
6				Outside EEZ	128/38 0/23/15	Total In/Out	15 -11/49	64 4/70	31 -11/57
7				Sword-fish	128/38 0/23/15	Total In/Out	-4 -11/5	53 38/55	2 -11/9
8	Fixed 166	Freely	No	No	129/-- 25/61/43	Total In/Out	5 5/6	5 4/6	5 5/5
9				Outside EEZ	129/37 0/22/15	Total In/Out	24 5/48	51 4/56	34 5/51
10				Sword-fish	129/37 0/22/15	Total In/Out	5 5/5	41 37/41	5 5/5
11	Fixed 166	Freely	Yes	No	136/-- 16/60/60	Total In/Out	1 -8/12	27 9/29	8 -8/17
12				Outside EEZ	136/30 0/18/12	Total In/Out	16 -8/47	64 9/70	31 -8/55
13				Sword-fish	136/30 0/18/12	Total In/Out	1 -8/12	55 37/58	8 -8/17

Table 6-2 (Continued).

MANAGEMENT OPTION	A PERMITS	TRANSFER -ABILITY	UP-GRADE	B PERMITS	ACTIVE PERMITS A/B S/M/L	CAPTURE LOCATION	MARLINS %	SWORD-FISH %	TUNA %
14	Variable	None--limited	No	No	170/--15/86/69	Total In/Out	24 14/37	56 43/57	33 14/44
15				Outside EEZ	170/64 0/38/26	Total In/Out	55 14/110	134 43/144	82 14/124
16				Sword-fish	170/64 0/38/26	Total In/Out	24 14/37	117 101/118	33 14/44
17	Variable	None--limited	Yes	No	205/--16/104/85	Total In/Out	47 34/65	90 73/92	59 34/75
18				Outside EEZ	205/77 0/46/31	Total In/Out	85 34/153	184 73/196	118 34/171
19				Sword-fish	205/77 0/46/31	Total In/Out	47 34/65	161 144/166	59 34/75
20	Variable	Freely	No	No	229/--25/121/83	Total In/Out	71 63/83	100 94/101	80 64/90
21				Outside EEZ	229/100 0/60/40	Total In/Out	121 63/197	222 94/236	157 64/215
22				Sword-fish	229/100 0/60/40	Total In/Out	71 63/83	195 185/196	80 64/90
23	Variable	Freely	Yes	No	236/--16/120/100	Total In/Out	67 50/89	122 100/124	83 51/102
24				Outside EEZ	236/100 0/60/40	Total In/Out	117 50/204	244 100/260	159 51/227
25				Sword-fish	236/100 0/60/40	Total In/Out	67 50/89	217 190/220	83 51/102

Table 6-3. Relative risk[1] of under-development, catch competition, market competition, and over-utilization caused by the 25 management alternatives.

Management Action	Under-Development	Catch Competition	Market Competition	Over-Utilization
1	1	5	5	5
2	5	1	1	1
3	4	2	2	2
4	4	1	1	2
5	5	1	1	1
6	4	2	2	2
7	4	1	1	2
8	5	2	2	1
9	4	2	2	2
10	4	2	2	2
11	4	1	1	2
12	4	2	2	2
13	4	1	1	2
14	4	2	2	2
15	3	3	3	3
16	3	2	2	3
17	3	2	3	3
18	2	3	3	4
19	3	2	3	3
20	3	3	3	3
21	1	4	4	5
22	2	3	3	4
23	3	3	3	3
24	1	4	2	5
25	2	3	3	4

[1] Calculation of risks (ranked 1 (low) to 5(high)) was as follows: under-development: % change in total tuna and swordfish catches; catch competition: 2 * % change in total tuna and marlin catches inside EEZ + % change in tuna and marlin catches outside EEZ; market competition: 2 * % change in tuna catches inside EEZ + % change in tuna catches outside the EEZ; and over-utilization: % changes in total swordfish and marlin catches.

Table 6-4. Percent Change in Predicted Effort (1,000 hooks) from current situation under four different fleet compositions of 166 active vessels

Alternative	Area of Catch	Percent Changes in Effort by Vessel Size Category			
		Small	Medium	Large	Total
A	In MHI EEZ	35	35	44	35
	Out MHI	35	35	35	35
	All Areas	35	35	35	35
B	In MHI EEZ	0	43	43	26
	Out MHI	0	43	43	36
	All Areas	0	43	43	32
C	In MHI EEZ	-100	66	65	-1
	Out MHI	-100	66	66	39
	All Areas	-100	66	66	23
D	In MHI EEZ	-100	-100	315	-54
	Out MHI	-100	-100	315	83
	All Areas	-100	-100	315	25

Table 6-5. Predicted Percent Change in Landings (Number of Fish) from current situation

Alternative	Area of Catch	Percent Change (Number of Fish)				
		Tuna	Marlin	Swordfish	Other	Total
A	In MHI	35	35	35	35	35
	Out MHI	35	35	35	35	35
	All Areas	35	35	35	35	35
B	In MHI	25	25	39	27	27
	Out MHI	37	33	41	40	40
	All Areas	32	28	41	38	36
C	In MHI	-3	-5	50	6	5
	Out MHI	41	28	58	56	52
	All Areas	24	10	58	46	40
D	In MHI	-58	-55	3	-20	-39
	Out MHI	82	58	153	148	132
	All Areas	28	-6	138	115	89